THE MODEL ENGINEER

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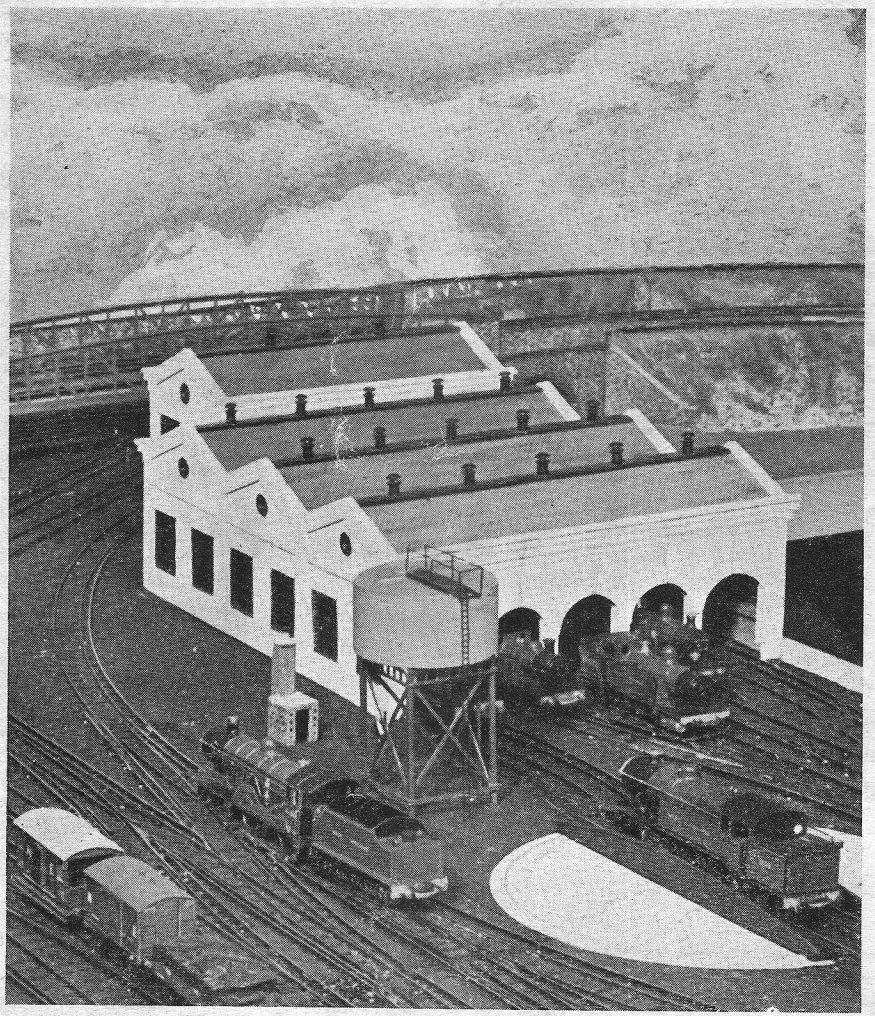


A realistic locomotive running shed built to the scale of 4 mm. to 1 foot by the Rev. Edward Beal for his "West Midland" Railway

THE MODEL ENGINEER

Vol. 94 No. 2331 Percival Marshall & Co., Limited Cordwallis Works, Maidenhead January 10th, 1946

Smoke Rings

Our Cover Pictures

FOR a long time past we have been printing on our front cover page interesting photographs and drawings reflecting model engineering in its various aspects. These pictures have been widely appreciated, forming as they do an entertaining gallery of model-making achievement. To do fuller justice to these subjects, we have arranged to devote a larger share of the front page space to the pictures, and so make the reproductions of even greater interest. Many of our readers must have among their records some photographs which, from their human or model-making interest, are worthy of the distinction of a place of honour on our cover. We should be glad to see some of these photographs and, if suitable, make a selection for reproduction. Such pictures should be of good quality from a photographic point of view, and should, by their technical or human interest, be of a kind to arrest attention. It is important, too, that the sender should be the actual photographer, or should at least have the photographer's permission to reproduce. For each picture selected for use we shall be pleased to pay a fee of 10s. 6d., and unsuitable pictures will be promptly returned. This is a standing invitation to our readers to contribute to our picture gallery whenever they take a photograph which evokes a comment from a friend: "That's a fine model," or "That's a striking picture." It gives them, in fact, another opportunity to share in making THE MODEL ENGINEER a better paper than ever, and at the same time to achieve a little personal distinction in being featured on our front cover. Pictures may be of any subject of engineering, marine, railway or model-making interest, provided that it will make a model engineer stop and look at it twice. So comb through your records and send us along something which has given you pleasure, for it will please other readers too.

Model Engineering in Denmark

I AM glad to hear that model engineers in Denmark were able to carry on in a modest way in spite of the rigours of the German occupation. Mr. A. Lyngkilde, of Helsingor, writes me that he managed to build "The Bat," starting with the instructions by "L.B.S.C.," but completing it on his own lines. It turned out to be a powerful and free-running engine, and, as a first venture in "O"-gauge steam, highly successful. He says: "The 'Bat's' little sister was completed in May, 1944, and the owner, Capt. A. V. Arendrup, of the Royal Life Guard, Copenhagen, gave it the name 'General Montgomery,' and the number 1944. Since her completion 'The Bat' has been running regularly on the track of the Danish Model Railway Club, which is situated in a room at one of the Danish State Railway stations in Copenhagen, called Norrebro. The Germans did not know anything about it, and to us in the club it was very amusing. Capt. Arendrup is the president of our club. My most kindly greetings to you, and thanks for THE MODEL ENGINEER, which has given me help in more than one way during these five years."

Black Finish on Wood

HERE is a little problem for specialists in realistic finish. A reader is modelling an old-time sailing ship and wishes to put a black finish on the yards, a dull matt finish, as he describes it, like the back of an ebonised hairbrush. The yards are to be made in lance wood. We have at various times published recipes for coloured finishes on metal, but these may not be quite suitable for wood. Advice would be appreciated.

A Dutch Journal

BEFORE the war, Dutch model engineers were much helped in their work by an enterprising journal, *De Modelbouwer*, published at Hengelo. The Germans, suspicious of its influence, ordered its contents to be changed to suit the Hitler Youth movement. The editor refused, and the journal was handed over to a German publisher. It is now to be restarted in its old form as the organ of the Netherlands Society of Model Engineers, the first number being announced for January. I have been asked to contribute an article on the work of English model engineers in wartime and I have taken the opportunity of conveying the good wishes of MODEL ENGINEER readers to their opposite numbers in Holland. The editor of *De Modelbouwer* writes: "There are many feelings of friendship and admiration in Holland for your people and for your soldiers. We saw many terrible air combats here during the nights of '42 and '43, but we saw your soldiers, too, when they came here with their tanks on the 1st April, '45, a day we will never forget!"

Percival Marshall

A Sad Case!

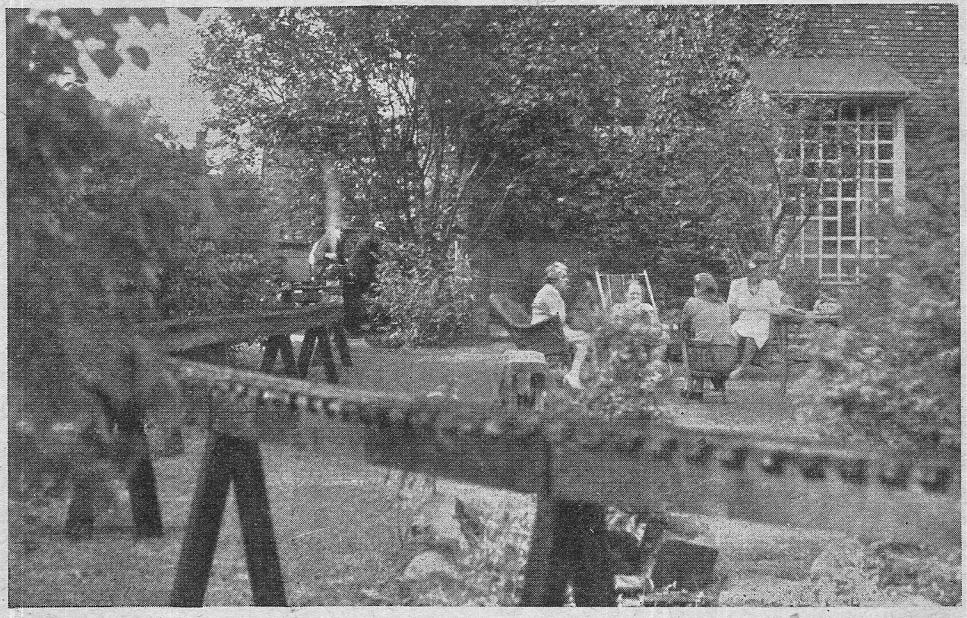
By "L.B.S.C."

A Tale of Tubes

HERE is the tale of a reader with a little spot of bother, which might serve as a peg on which to hang a little dissertation. Our unlucky friend built a 2½in. gauge locomotive to "words and music," and used ⅜-in. by 24-gauge tubes in the boiler, being a fairly expert coppersmith and able to silver-solder the thinner-gauge tubes, which I had advised on the score of increased efficiency, without burning them. The job panned out O.K. and the engine behaved well on the road, proving a first-class steamer and pulling her weight without any trouble, until one fine day she seemed to be developing tuberculosis, being a little short of breath. As this seemed to become worse on a succeeding run, our friend investigated, and found that two of the tubes were completely blocked up, and the others, including the superheater flue, in a more or less dirty condition; "tuberculosis" in very truth! The owner, alas! was to blame, for he had never troubled to sweep them regularly when the engine was working all right. Remembering a note about tube cleaning which had appeared many moons before, he obtained a small bottle brush, lengthened the handle by soldering a piece of stiff wire to it, and proceeded to make amends for his neglect, and all went well until he came to the superheater flue, which the bottle brush wouldn't enter, owing to the presence of the element, and one tube, which was apparently choked by a cinder which the brush wouldn't shift. He therefore prodded the flue with a piece of stiff wire and succeeded in loosening the deposit both sides of the element, blowing away the residue with a tyre pump having a bit of small-bore tube attached to the hose; but the other tube remained solid. After several ineffective prods he got a bit impatient, put a length of $\frac{3}{16}$-in. rod down the tube from the smokebox end, started biffing it with a hammer, and—I daresay you have already guessed—shifted the obstruction but split the tube in the process! Now he wants to know if there is any chance of making a permanent repair without pulling the whole issue to pieces, or scrapping the boiler, which is otherwise all right.

Two Remedies

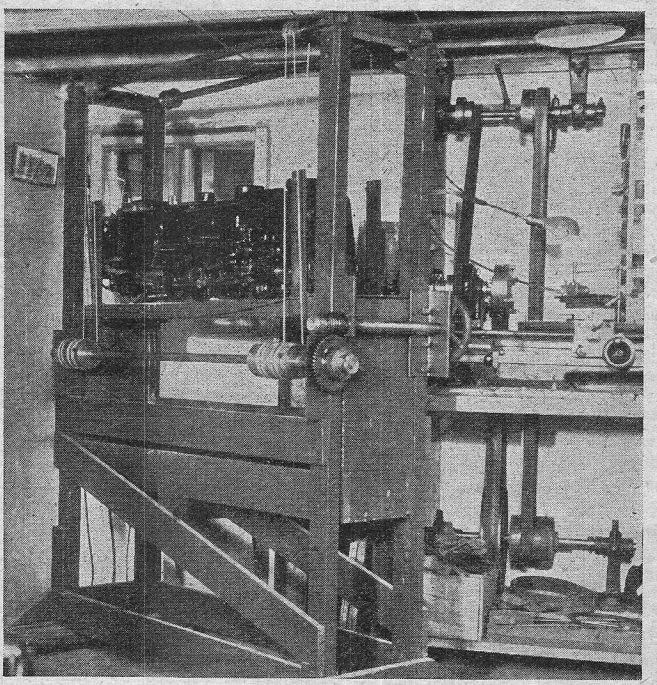
Luckily, the tube is in the bottom row, just off centre, and it can be got at from both ends, being practically in line with the fire-hole opening and almost clear of the blast-pipe at the smokebox end. The boiler is a short-barrelled one with a narrow firebox. This gives two alternative ways of effecting a repair without dismantling the engine at all. The first way is to cut out the defective tube and replace it by a new one. The cutting-out can be done with a home-made tool, made from a bit of ⅜-in. round silver-steel about 1 in. long. Chuck it in the three-jaw, face the end, centre and drill it about ¼ in. deep with a No. 21 drill,



Main line of T.S. and P.H.RR.—with directors' meeting in progress!

and tap it $\frac{3}{16}$ in. by 40. Reverse in chuck, turn the end slightly taper, so that it will enter the end of the tube ; face off, and either file a few teeth in the tapered part, or file it half away like a D-bit. Harden and temper to dark yellow. Screw a length of $\frac{3}{16}$-in. rod into it, just long enough to project beyond the fire-hole, and allow sufficient to hold in the chuck of a hefty hand-brace, or take a tapwrench. The reason for the short cutter and thin shank is because, if the whole doings were made from the $\frac{3}{8}$-in. steel, same would foul the blast-pipe and fire-hole ring ; but the shank being thinner, allows the cutter to be presented fair and square to both ends of the tube.

Wet the business end with some cutting oil and operate first on the firebox end of the tube, kind of " removing its tonsils " ; as soon as the tube is free, put a piece of rod down it, so that you don't lose it, and then operate on the smokebox end. After cutting away that end of the tube, slightly enlarge the hole with an ordinary taper reamer ; only just the weeniest bit, so that the defective tube can be taken out through it. Clean all around the holes, and cut a new tube, which should be softened and cleaned at both ends ; inset this and drive a greased taper drift into each end, so that the tube is expanded tightly against the smokebox and firebox tube plates. If both holes are truly round, nothing further should, by the good rights, be required ; but in case of chattermarks or any other irregularity, take old Geordie's advice about the leaky tubes on the old " Rocket," and " sodder 'em up." This will restore the boiler to the *status quo*.



The transfer elevator—note lifting-gear

The alternative method is not quite as efficient but is quicker, although it can only be used if the tube ends are not obstructed to any great extent. A piece of tube will be needed, of such diameter that it is a close fit inside the original boiler tube, which should be cleaned out quite free from grit and dirt, and an oily bottle-brush run through it. Soften the ends of the liner tube, carefully drive it in until both ends are flush with the original tube, then expand each end with a taper drift as above.

I used this method with perfect success on a friend's engine on a tube which had collapsed under pressure when the boiler had been allowed to run short of water. The collapsing was put right by driving a steel ball of requisite size clean through the tube, afterwards fitting and expanding the liner. It has given no trouble from that day to this.

Prevention is Better than Cure

If tubes are regularly swept, no trouble with choking should ensue. I use a tuft of flax in a bit of rod with a looped end (exactly as in full-size practice in the old days on the " Brighton "), which usually does the trick, and goes down each sideof the elements inside the superheater flues. A feeding-bottle brush with an extension handle of wire, soldered on, makes a good tube cleaner. The late " Bro. Wholesale " used a pull-through, same as used for rifle-barrels. I have some of them here now. They have short, stiff bristles in a twisted wire centre, and one end has a tapped socket into which a stiff wire of required length can be screwed. However, if anybody gets a cinder, or a " bird's-nest," or any other solid obstruction in a tube, take a lesson from the foregoing and never attempt to knock it out. Get a bit of iron wire or thin steel rod ; flatten one end for an inch or so, then twist the flattened part like an auger, and file a drill point on the extreme end. If this is applied to the obstruction and turned back and forth, it will cut its way through, the twisted part will hold the residue, and you can pull the whole lot out without the slightest risk of damage.

Epilogue of the Little Ramsbottom 2-4-0

A Stourbridge reader, Mr. R. S. Mantle, who is very well informed on matters relating to the old " Nor' West," has been kind enough to forward some further particulars of the little Ramsbottom engine " Empress," which was recently illustrated in these notes, as he not only knew the engine well, but still has the patterns from which the castings were made. The locomotive was built at Lord Dudley's engineering works at Tipton. Gilbert Henry Claughton, who

was the son of the then Bishop of St. Albans, was apprenticed about 1864 to Beyer Peacock's, who were then building engines for the L.N.W.R. ; and after serving his time, went to the above-mentioned works as a draughtsman, and lived at Himley Hall, the present seat of the Earl of Dudley, Lord Dudley being his cousin. Whilst there he obtained drawings of the full-sized engines from his old firm, which he scaled down ; patterns were made, and the engine built. It was finished in 1876, the date it bears ; it was a good steamer, and could handle from 12 to 16 adult passengers. Suitable steel rails were rolled for it and laid down in Himley Park ; after running for some time, it was placed in Sir Gilbert Claughton's dining room at the Priory Grange, Dudley, where it remained until taken away by his nephew, Mr. J. V. Campbell, who inherited it under his will. Thence it went to its present owner. Incidentally, the works where it was built started making locomotives in 1861, and continued to build them until the place was dismantled in 1923.

During my childhood years and early life on the railway, I eagerly "devoured" all the books and periodicals relating to locomotives that I could possibly beg or borrow—I couldn't afford to buy many!—and recollect reading several accounts of little engines similar to the above. I often wonder what became of the old-timers ; does any reader know ? In addition to those built privately, surely all the products of Faulkner, Lee, Martin and other contemporary makers have not been scrapped !

The T.S. & P.H.RR. in a New Setting

Our worthy friend of Montreal, Bill Leggett, has changed his address and moved to what a real estate agent would call "more commodious premises," and has kindly forwarded some pictures of the Toad, Swamp and Punk Hollow Railroad and shops in their new location. The line is now a continuous track about 300 ft. long, with plenty of curves and grades, which doesn't seem to worry the locomotives at all. The construction can be seen in the picture showing part of the line ; planted posts are conspicuous by their absence, the longitudinals being carried by inverted V-supports which are secured to creosoted planks 2 ft. long, of 12-in. by 2-in. section, laid direct on the ground. The rails, laid to 3½-in. gauge, are T-iron on the usual sleepers, or ties, as they are known over the pond. The comfort of the feminine element hasn't been overlooked, as you can see by the picture ! As the line runs right around the house, a hedge was planted between it and the sidewalk in the avenue, ostensibly to hide the track ; but everybody far and near knows it is there, as may easily be imagined.

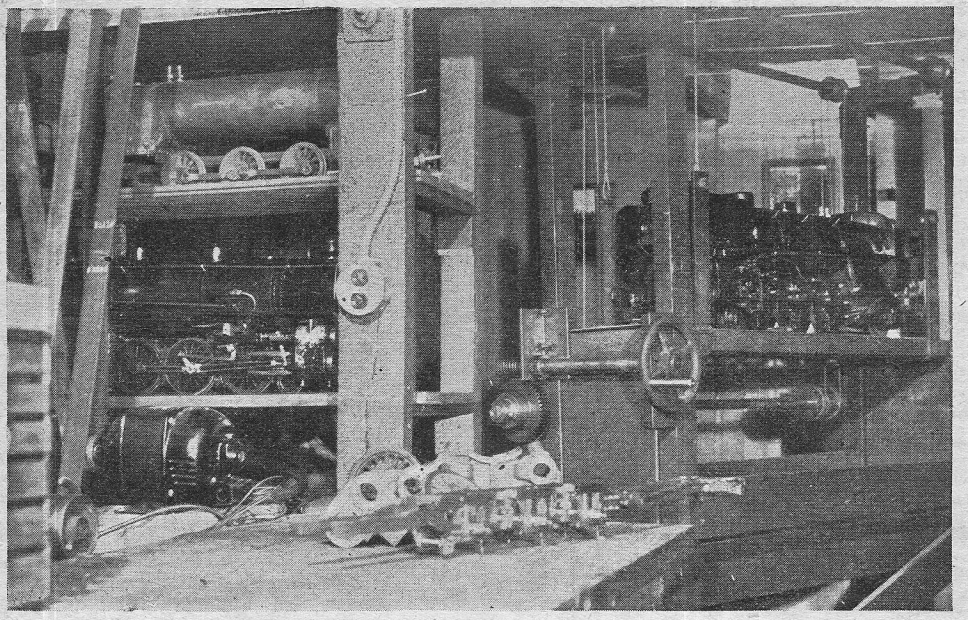
Bill's new workshop being in the basement, and 3½-in. gauge Canadian locomotives being hefty things to lift about, a means was devised of getting the locomotives from the workshop, where they are stored on shelves, up to the track ; this consists of a "transfer elevator," in other words, a portable lift running on castors. This is clearly shown in the pictures, and needs no description. It is run up to the shelf where the required engine is standing, the platform adjusted for height, the engine run on to it, the whole bag of tricks wheeled over to the exit window, and the engine hoisted to the "top storey" and run out of the window, which is the one seen at the back of the lift in the view showing the elevating gear. This ingenious contrivance saves a dickens of a lot of time plus muscular exertion. The workshop is fully equipped, and contains, among other useful machine tools, a chain-driven milling machine ; Bill also finds a 3½-in. Drummond lathe a useful auxiliary to the big one shown in the picture illustrating the miller.

Cylinder Sizes

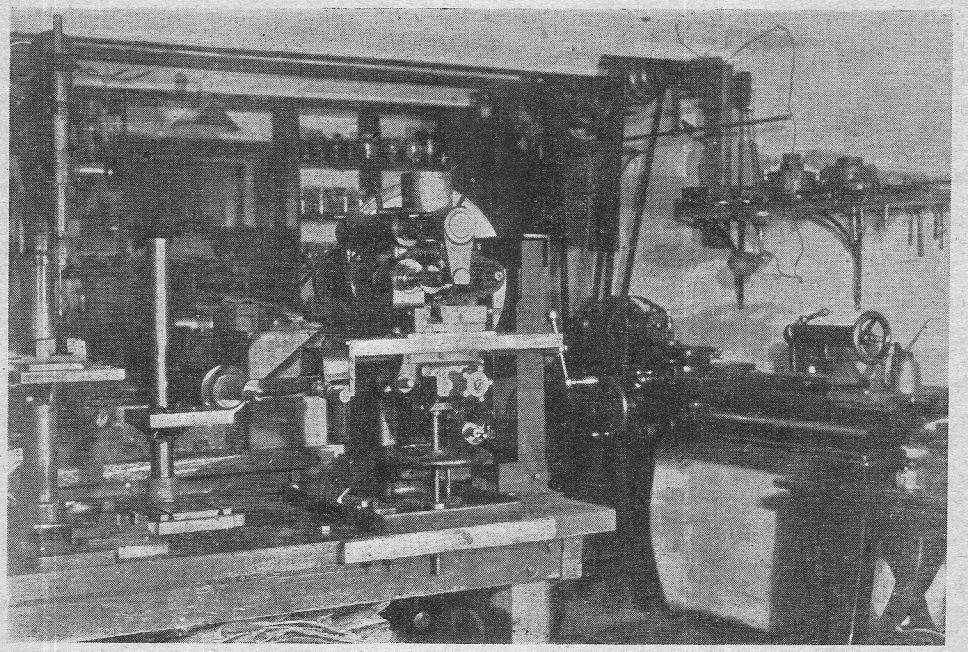
In his article on the "Nucleus of a Garden Railway," in the issue of November 22nd last, "H.J.H." gives the date of the breakaway from the "scale equals cylinder bore" idea, as 1918. This statement is a wee bit inaccurate, to say the least of it ! Apart from what private experimenters and "locomotive hobbyists" had done in the matter long before the date quoted—including your humble servant—the late firm of James Carson & Co. Ltd. fitted cylinders ⅝-in. bore to their "half-inch-scale" locomotives way back in 1906 ; and in their 1907 catalogue, a copy of which I have here on my writing table at the present moment, is a picture of a small boy (actually Carson junior) being hauled by a 2½-in. gauge "Cardean" with cylinders of ⅝-in. bore. It was the success of this firm's locomotives which forced the diehards of the "cylinder-bore-equals-scale" idea to abandon it. It was a very reluctant abandonment, too ; for in some quarters ⅝-in. bore for a 2½-in. gauge locomotive is *still* regarded as the absolute limit of size, an example being the "Cock-o'-the-North" which I described in 1942. I shan't forget in a hurry the ridicule to which I was subjected when I described how to build a 2½-in. gauge locomotive ("Fayette") with cylinders of 13/16-in. bore, and was told that the boiler would never steam them, 11/16-in. being solemnly quoted as being the largest size possible, even with highly superheated steam. "Fay's" boiler made enough steam for *four* cylinders of that size, with a bit to spare for blowing the whistle !

"Tinplate" Curves

Regarding "tinplate" methods ; if you like to follow "tinplate" practice, you can get a big engine around the equivalent of a "tinplate" curve ; but at what cost of wheel slip on one side and flange friction ? The late Mr. "Iron-wire" Alexander described how to build a small traction engine which, to obviate the trouble of making a differential gear, drove on one wheel only ; but our worthy friend could hardly arrange a locomotive to drive on one wheel (*true* single-wheeler ?), nor is a differential gear a practical proposition in a locomotive with direct drive on inside or outside cranks, although it could be applied to a gear-driven engine, such as a "Shay." The rolling wheels could be independent, true enough, but that idea is already exemplified in numerous passenger-carrying flat cars having a ball-bearing in the centre of the wheel. Your humble servant built one of this type for carrying adult passengers over twenty years ago ; a seat-board which ran on roller-skate



The "Roundhouse" section



Part of T.S. and P.H. workshop—note chain-driven milling-machine

wheels, each having a self-contained bearing. The treads were turned with a flange, to suit the rails. However, it isn't the rolling wheels that matter so much as the driving wheels; and if the curve is so sharp that violent slipping must take place on one wheel, what is going to happen to the tractive effort, and what will be the effect of the continued stress on the axle? The engineers of the erstwhile L.C.C. tramways could give the right answer to that question; for night after night passengers on the Dulwich route would see a single-truck car packed up on the Goose Green spur line, waiting to be towed to the depot, after breaking an axle on the "tinplate radius" curves at either end of Champion Park, the road running parallel with Denmark Hill Station.

Engines and rolling stock for "O" gauge, running on "tinplate" curves, have wheel treads at least ¼ in. wide, and very often more, plus huge flanges of proportionate depth. Even the beautifully-made clockwork locomotives on Dr. A. C. Hovenden's "scale" edition of part of the L.B. & S.C. Railway had wheel treads and flanges out of all proportion to the size of the engine; this can be plainly seen in the illustrations given in the early days of this journal. This means that in order to enable an engine of 7¼-in. gauge (one-eighth full size) to get around a "tinplate radius" curve, the wheels would have to be about one-third the width of those of a full-sized engine, and the rail gauge spread out to accommodate them; also, a pretty figure a 4-4-0 or 4-2-2 would cut, with one side of bogie wheels right out clear of the frame, and the other side almost under the chimney! On top of that, the safe speed would be a mere crawl; you can't "scale" Nature, and there would be a weeny bit more centrifugal force to contend with in a 7¼-in. gauge locomotive than in its "O"-gauge counterpart. If a small dog or cat, running down the street, collided with friend "H.J.H." he wouldn't worry about it; but if it happened to be a runaway horse of brewer's dray proportions, the tale might end differently, and we wouldn't enjoy any more entertaining articles from his pen! Different folk have different fancies, and if our worthy friend has a yearning to go grinding around hairpin bends at a walking pace, that is his pigeon; but I just thought it would be as well to "spill a few beans" to anybody else who might have an idea of going a little farther and acquiring a 4-ft. 8½-in. gauge 4-6-0 to run around the school playground and amuse the kiddies!

Dual-purpose Donkey Pumps

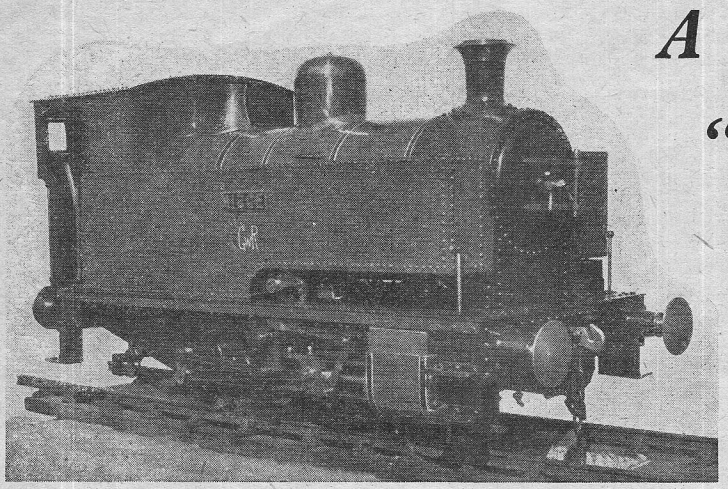
It is said that when the judges at the Paris Exhibition of 1889 asked Billy Stroudley why he didn't provide a means of feeding the boilers of his engines when they were standing still, the old boy promptly replied, "My engines are intended for running, not standing still!" Be that as it may, he actually *did* provide a means of stationary boiler feeding; and some of the old Kitsons were fitted with it. Kitson's built 409 to 420 of the class described by Mr. Hambleton in November 29th issue. Certain of them were subsequently fitted with Westinghouse brake apparatus and had a red line added to the black bands adorning the olive-green paint. The piston-rod of the donkey pump was extended through the bottom of the pump cylinder and terminated in a small pump ram working in a vertical barrel, the top of which was level with the running-board, or "gangway," as the enginemen called it. The usual valves were provided and the pump delivered into one of the feed pipes. If the water in the boiler ran low when standing in a siding, all we had to do was to start up the donkey; and if the main air reservoir was fully charged there was an air release cock provided on the donkey which let the contents of the pump cylinder blow straight into the atmosphere. There was thus no need to "play trains" up and down the siding. Incidentally, reversing the Kitsons wasn't always a "sweet dream," but a bluepencil nightmare, as the coil springs on the weighshaft, which were intended to balance the motion, were invariably broken. To the best of my recollection, there were nine notches each side of centre, and to horse her back into the one nearest middle, with a broken spring and steam on, required all the "Sunny Jim" that your humble servant was capable of putting out.

Three of the passenger engines also had what old Billy called "inspirators"; *Salisbury* (215 of the "Gladstone" class) was one; I forget the others. It was a species of injector and was fitted low down alongside the ashpan on the "donkey" side of the engine. To the best of my knowledge, they were very seldom used, as the Brighton enginemen preferred the pumps, and the water in the tenders soon became too hot for injector working, anyway.

For the Bookshelf

Introduction to Marine Engineering, by Commander (E.) A. Funge Smith, R.N. (London: Edward Arnold & Co., 41-43, Maddox Street, W.1.) Price 5s. od. net.

This is an interesting and timely handbook of more than 150 pages, in which the basic principles of marine steam engines and boilers, heavy-oil engines, Diesel engines and electrical propelling machinery are lucidly described and clearly illustrated. Most other main items which come under the general heading of Marine Engineering, as well as something of the training of marine engineers, are also briefly dealt with. The sketches and diagrams are excellent and the photographs have been well chosen to add interest to the book and to arrest the attention of the reader. We think the author, restricted though he is by the limitations of space, makes a valiant effort to achieve his main purpose of persuading his readers to take up marine engineering as a career.



A REAL "DOCK RAT"

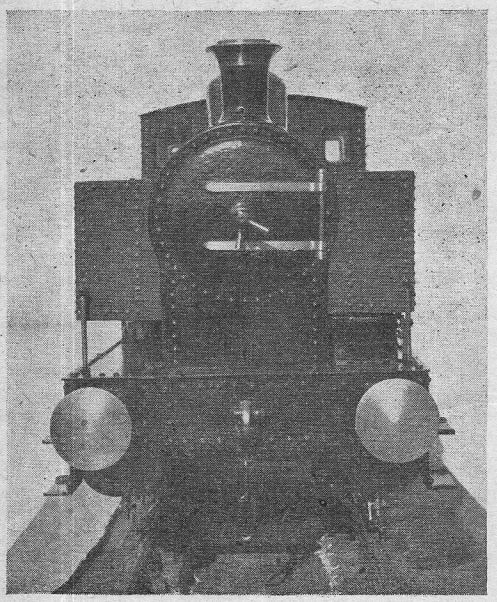
By

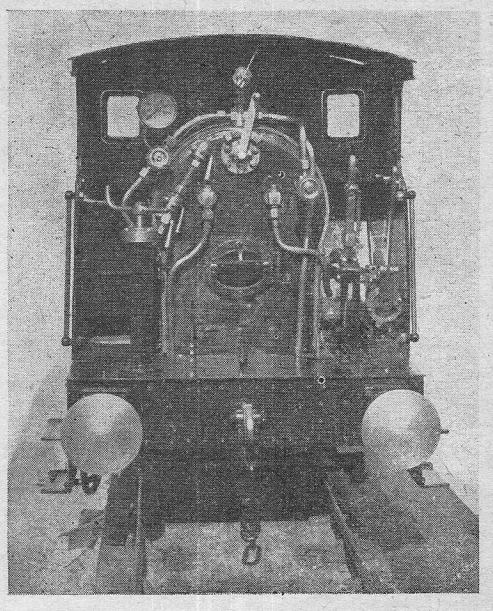
J. G. Tindall

HAVING just completed my "Midge," for which I was awarded the first prize at the model engineering exhibition at "Agar's Plough," Slough, this summer, I thought a short description of the engine would be of interest to intending builders.

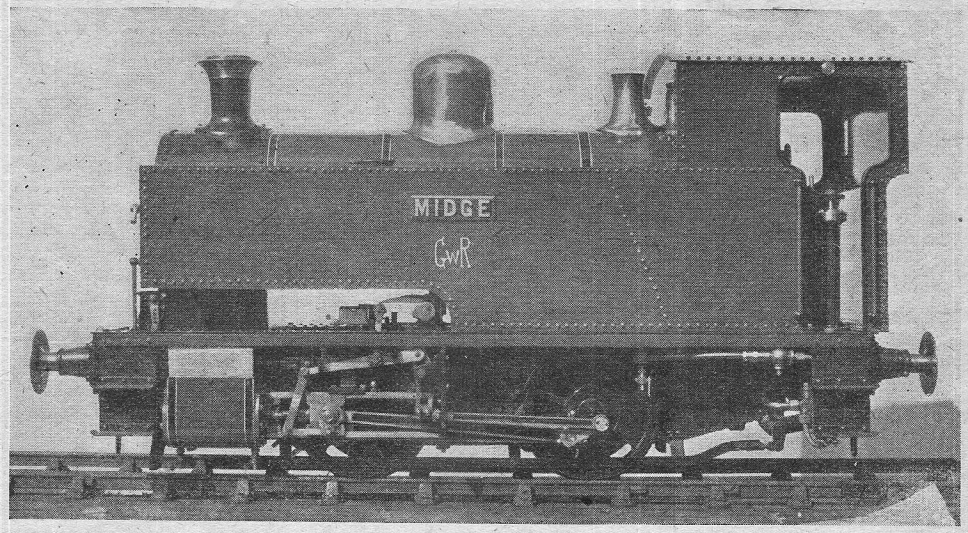
I have built it in fourteen months, which I think is not too bad, in view of the difficulty of obtaining material, etc. ; but, as usual, THE MODEL ENGINEER gave me great help, for after advertising in "our paper," I received a reply from a reader at Wedensfield, Staffs., who said he could supply me with some castings. Another reader offered to loan me THE MODEL ENGINEERS containing the drawings ; these I rough-sketched and returned. I then began on the frames, and after a short time I received castings of wheels and cylinders, horn-blocks, etc. With the help of another engineer friend, I made the remaining pattern and sent to Wedensfield for casting. All the castings were found to be very good, both iron and gunmetal ; only one casting was found defective, and this was promptly replaced.

The motion and frames were now finished and I started thinking of the boiler ; the copper for this was hard to get, but was procured by advertising again in THE MODEL ENGINEER. Owing to the shortage of copper, I decided to make a plain boiler to Mr. Simpson's original drawing. I





Front and cab views of "Midge"



"Midge," the "Dock Rat"

flanged all the plates and drilled all the holes and fitted the boiler together; but, as the tackle to braze such a boiler was not available, I got in touch with Mr. Goodhand, at Gillingham, who brazed up the lot, drilled and fitted the stays and tested same with water and steam. A very good and clean job he made of it! The boiler is lagged with asbestos sheet and thin brass sheeting and straps; tanks are $\frac{1}{16}$-in. sheet brass, flanged, riveted and sweated inside with solder. The cab is 3/32-in sheet brass and riveted; the back of cab takes off complete for driving and is fixed with two screws at the top.

Boiler and Fittings

The boiler is all copper, $6\frac{1}{4}$ in. diameter and $\frac{1}{8}$ in. thick, and has seventeen $\frac{5}{8}$-in. diameter copper tubes. The backhead has the usual fittings, water-gauge, steam-gauge, whistle-valve on turret, blower, injector steam-valve, check-valve to injector, check-valve to hand pump and regulator. I have fitted a tipping grate of my own design; it is worked by lever in the cab. There are also blow-down, drain-cock lever and damper.

The pistons are packed with graphited yarn; crossheads are steel of my own design and fitted with bronze slippers. All rods are fitted with oil-cups and there are oil-boxes to all axle-boxes. A mechanical lubricator is fitted on the footplate and driven from the valve-spindle crosshead; it is fitted with a $\frac{3}{16}$-in. diameter pump and works beautifully, delivering oil direct to the steam pipe.

All valve-gear ends and pins are case-hardened; the cylinders are gunmetal, $1\frac{3}{4}$ in. bore, $2\frac{1}{2}$-in. stroke. I have had the locomotive under steam on test bench, but, not having a track, I have been unable to test her fully. I have the safety-valve set at 65 lb., which gives plenty of power; on testing with brake full on, it wants some holding back.

All Straightforward

I am highly delighted with both the looks and power, and think THE MODEL ENGINEER and the designers of this little "dock rat" are to be congratulated on such a fine engine to model. I may say I am a locomotive engineer by trade, and did not find any snags in the design; it was just like working on its big sisters and was all straightforward. It should make an ideal engine for small gardens, as it turns in 22-ft. radius. The whole of the lathe work was done on a $3\frac{3}{4}$-in. Willimot "Ideal" lathe, so it should be within the scope of most amateurs' gear. The finished engine weighs about 2 cwt.

I am now getting busy on a 2-in. scale showman's traction engine with similar boiler.

ENQUIRIES FROM OVERSEAS

We have received enquiries from the following overseas firms who desire to arrange agencies or to purchase goods from British model and tool supply houses. Will those firms who are interested please reply to the addresses given:—

CLAUDE GREEN, 43, Wai-iti Road, Timaru, New Zealand. (Model supplies required.)

JAQUES, 21, Fawcett Avenue, Winnipeg, Canada. (Model supplies and small machine and other tools required.)

MILLER-GRAY AGENCY, Platt Building, Portland 5, Oregon, U.S.A. (Model supplies required.)

The Tale of a Tender

By Cpl. H. R. HADLOW, B.A.O.R.

IT all started in Normandy, a few miles from the original landings of our D-day armies, at the beginning of September, 1944. We all thought the unit would be static for a month or two, so the writer decided to start work on the tender for the W.D. 2-10-0 austerity locomotive (better known now as "Austere Ada"), of which I had seen many examples on the sidings in England awaiting transportation to the Continent.

Scrounging

The first few days of our arrival in Normandy were very hectic, as is usual with any move in the Army! But things very soon settled down and I had the opportunity for doing a bit of scrounging for suitable material for the frames and buffer-beams. There were several large pieces of blown-up German tanks around our camp, so I had a look at these first—and was not disappointed! I found a sheet of steel, approximately 3/32 in. thick by about 2 ft. 6 in. square. It took me more than two hours with a hacksaw to cut out two suitable strips of metal for the frames, as the sheet was very badly buckled down one side, while the opposite side had a double right-angled bend in it! After squaring-up and riveting together, axlebox slots, etc., were marked out and cut with hacksaw and file.

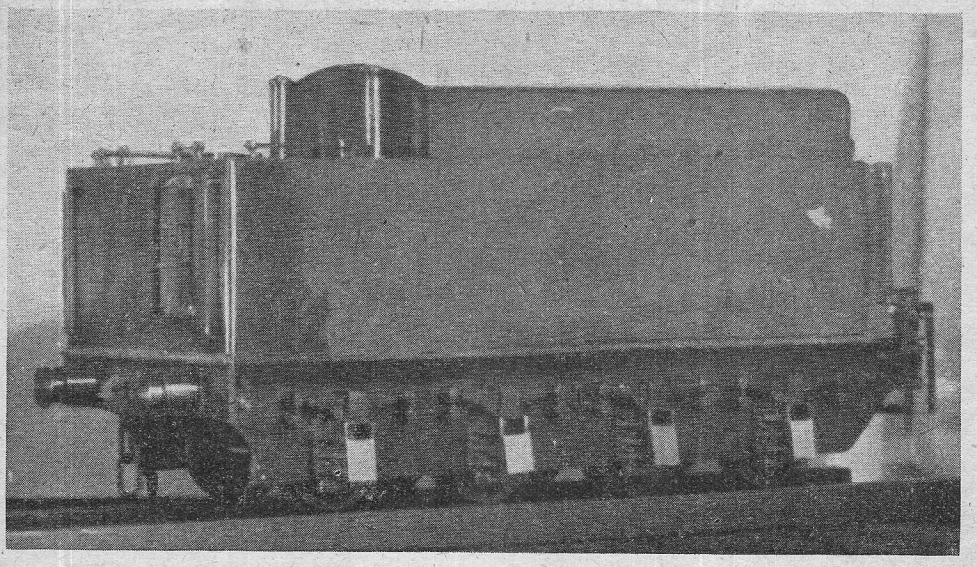
My luck held when I went a'hunting for angle stuff for the buffer-beams, as I found enough for a dozen or more locomotives and tenders—except for the fact that it was most emphatically *not* bright drawn mild-steel! It was pitted with rust and well over an inch in width, requiring a great deal of filing to get it to resemble the $\frac{3}{4}$-in. B.D.M.S. which could be bought so cheaply in the shops before the war.

A Move Forward

The frames and beams were just about ready for assembly when the unexpected order came to move on—to Belgium, though we did not know *that*. Our first stay was made at a place where it was impossible for me to continue work on the tender; but we were there for only a very short time when the order came to move again, and this time we ended up in Brussels. Here we fitted up quite a decent workshop and, after the normal rush of the first few days, I again started on the model, working usually from 9.0 to 11.0 each night. Sometimes several nights would pass without any spare time being available, as at this time I was running two (sometimes three) 4-kW motor-generator sets, and occasionally they can be quite troublesome!

In spite of this, the frames were finished and assembled, the horn castings being supplied by George Kennion, and a fellow member of the S.M.E.E. contacted with a view to machining the wheels and axles, as I could not get access to a lathe.

Then began the search for sheet metal for the bodywork. Visits to several salvage dumps produced nothing at all suitable, and I began to think that I had "had it," when a Belgian friend



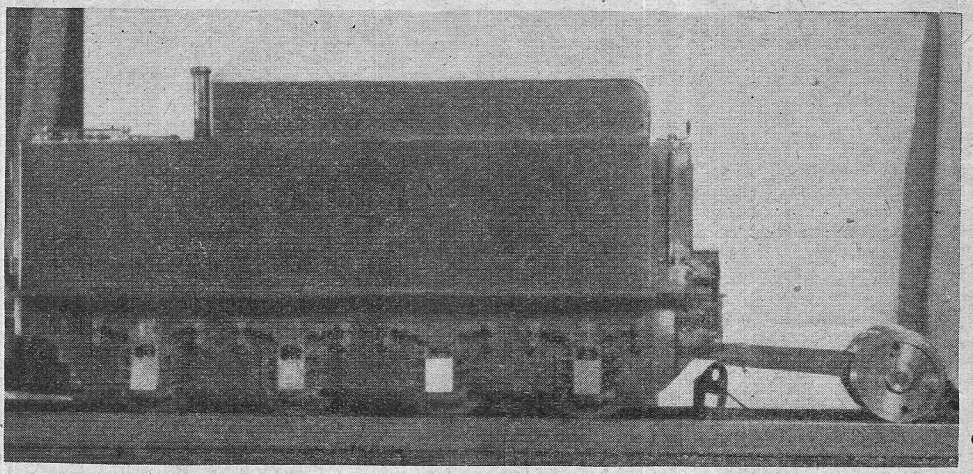


Photo showing tender and as much of the engine as is finished!

turned up at the depot one day with a damaged hot-water cylinder of copper. I would have preferred brass, because, though easier to work, copper shows every scratch—but—Hobson's choice!

This copper was too thin for the sole-plate, but I was very fortunate in finding an engraved brass plate about 3/32 in. thick, out of which I could just get the sole-plate. Much energy was spent in draw-filing out the engraving; but it was eventually completed, marked out and cut to size.

The body sides and ends were built up in two parts, as per "L.B.S.C.," the front being fitted with sliding coal gate, which tickled my friends' fancy very much! The self-trimming coal-bunker came next and reminded me of a jig-saw puzzle, but the pieces fitted together quite well and looked all right. The top plate was equipped with raised manhole with hinged cover.

A Stoppage

And there work was stopped for five or six weeks, as I could not find anything anywhere near suitable for making up the union fittings for by-pass, injector and pump. I collected an amazing assortment of bits and pieces that I thought *might* be suitable; but none of them would do, and what I thought and said during this hold-up is nobody's business! Suffice it to say that I managed to make up three unions in the end, the only snag then being that there was no room on them for lock-nutting on to the sole-plate, so I decided to silver-solder them on. This was a fatal mistake—the effect on my beautiful sole-plate being terrible to behold, and I came very near to weeping or throwing everything out of the window! The plate was sadly bent and buckled and, at first, I had no success in trying to persuade it to lie flat—I used every dodge I knew, but the final result, though better, was nothing like the original.

I was not in a position to make another sole-plate, as I doubt if my luck would have held out in my renewed searches for a suitable piece of metal, and the question of three more union fittings cropped up again. After continuing to swear fluently in French, English and "L.B.S.Cs." Esperanto for some days, it was finally decided to see what could be done by bolting the plate down on the frames. It pulled down pretty well; so I set to and soldered on the bodywork with it *in situ* on the frames. After a hectic couple-of-hours' work with blowlamp and soldering iron, I was rewarded with the sight of an almost finished tender; or so I imagined! I soon found, however, that the details such as steps, handrails, etc., take almost as long as the remainder of the job. But after several false starts, they have all been completed and fitted.

The wheels and axles arrived about this time, beautifully turned by Mr. S. Harris, of the S.M.E.E., and the making of the axleboxes and fitting them finished off the tender, except for painting. At the time of writing, this still remains to be done; I have yet to decide definitely on a colour scheme, but I think it will be the standard Army "khaki" green, with black frames and yellow lettering.

A Relief

I must admit breathing a deep sigh of relief (mingled with pride!) when the tender was completed—it had been "in the making" for twelve months and fifteen days! But it had given me many hours of contentment and pleasure in difficult times. And now I have started on the locomotive itself, as seen by the completed pony truck in one of the photographs. I do not think this will take so long a period to complete, as I now have the use of a fine motorised Leinen screw-cutting precision lathe and sensitive drill at the Forces Centre in Hamburg. But of this interesting Centre (and the locomotive) more anon, with the Editor's permission.

Power-Boating on the Round Pond

A COMBINED Nomination and Round-the-Pond race was held recently on the home waters of the West London Model Power Boat Club, Round Pond, Kensington Gardens, and, being the first event since 1939, and considering that many of the members are still in the Forces, or otherwise nationally engaged, the morning's fare was enjoyed by quite a good muster of competitors.

The Nomination part of the event was the usual estimation of time to complete the course, and the Round-the-Pond a handicap feature; and this latter, in particular, proved very interesting.

Most members of the M.P.B.A. who competed in the Club's pre-war Open Regattas will remember this Round-the-Pond event, and that accurate steering, rather than speed, is the first essential to negotiate the three turning buoys on their right side, and this lapse, as of old, was responsible for several competitors failing to qualify, although completing the course.

Several new boats were on the water for the

Mr. R. Beard's launch (winner of both events) starting off

Mr. R. G. Redhead's C.M.B. leaving the starting post

[*Some of the competitors. In the centre is Mr. Kidd's scale model of the "Empress of Britain"*

first time, and put up very creditable performances, especially Mr. Redhead's C.M.B. powered by Gwynn 8-c.c. air-cooled engine, which among its several attractive features possesses that rarity of starting at the first pull. Also on view was Mr. Kidd's 7-ft. scale model of the *Empress of Britain*, complete in every detail, being scaled down from plans of the original liner and referred to by Mr. Edward Bowness in the November 15th issue of THE MODEL ENGINEER.

It was pleasing to see a number of the old stagers in harness again, and most seemed little the worse for their four years' forced inactivity, with perhaps one exception, and that Mr. Butlers' *Mary Dean*, whose hull had twisted to such an extent that many of the steam pipes were found to have snapped at the joints and will require much of the owner's attention before it will be seaworthy again.

Both events were won by Mr. R. Beard's launch, and it is interesting to note that this craft, apart from minor reconstruction from time to time, has been a most consistent Nomination winner since 1935, its time difference rarely varying more than two minutes, whether competing in the straight or round-the-pond course.

A Useful Price List

From the East Kent (Live Steam) Co. Ltd., 7, Greenways, Hertford, Herts, comes a copy of a new price list of small tools, materials and sundries suitable for most model engineering requirements. The whole range is a wide one and we note that the prices are commendably moderate. Taps, dies, drills, milling cutters, lathe centres, tubes, flats, hexagons and angles, are but a few of the useful items listed, and we advise readers to obtain a copy of this list.

Also, we have lately inspected a remarkably varied selection of castings, parts and other materials for many of "L.B.S.C.'s" locomotives, produced by the same firm. We found them well up to the excellent standard which prevailed in pre-war days, and it is good to see that items such as these are again available.

The new price list costs 6d., which is refunded on the first order to the value of 10s. 0d.

Another Model Racing Car

By A. Capper

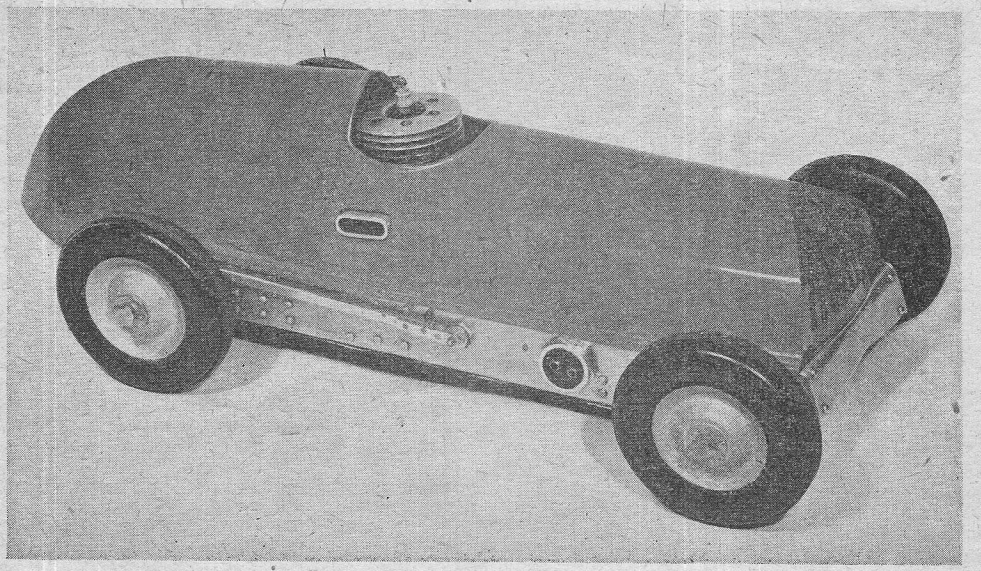
THE following is a brief account of my recently-completed racing car, also photographs and two drawings of the general arrangement. The 10 c.c. two-stroke power unit has already been described in the December 7th, 1944, issue of THE MODEL ENGINEER. It follows conventional practice, such as front-wheel drive, four-shoe centrifugal clutch and solid tyres. The final drive is through spiral gears.

It was after seeing Mr. Cruikshank's spiral gears on his "M.G." that I decided to use them on my car. When he wrote his own condemnation of them, mine were completed; but as the production of them had entailed the making of special gear I decided to use them. Whilst it may be true that this type of gear will never be as efficient as spur gears, I do not see why it should not stand up to the job, provided that the gears are well made and hardened.

The chassis is made from 16-gauge sheet duralumin and needs no explanation, the drawing being, I think, quite clear. I intended to use plywood, as I had a piece which would have been suitable; but, having procured a piece of dural from the scrap yard, I used it in preference to plywood. For reasons that do not admit of rational explanation, I dislike using wood where it is not ordinarily used in general practice. I expected to encounter difficulty in bending the dural and have consequently arranged for as little bending as possible. Anyway, I found that with a reasonable radius on the corner of the former, the dural bent without showing anything in the nature of a fracture.

The driving axle is built up from three parts: a centre housing for the gears, with two extension pieces housing a ball-race at the extreme ends. A thrust ball-race is also fitted to driving shaft and axle. They should, if well made, tend to lengthen the life of the gears. The making of the gears proved to be a very interesting job and not so difficult as I had anticipated. It is, after all, an ordinary screw-cutting job, with the exception that the power is transmitted through the lead-screw instead of the lathe spindle. My lathe is a $3\frac{1}{8}$-in. Myford. I fitted a handle at the tailstock end of the screw and fed the cutter into the blank, taking about six cuts for each thread. Silver-steel D-bits were used. I made twelve, in case there were any breakages; but, as it turned out, I did not need eleven of them, as one cutter completed the job. The driving-wheel has ten teeth and the driven wheel fifteen.

No torque rods are fitted, because I do not see the need for them, provided the springs are sufficiently strong to take their place. My car, on its first run, touched almost 40 miles per hour without any apparent ill effect due to lack of torque rods. Whether it will stand up to the faster speeds I hope to attain only time will tell. I found some little difficulty in housing the batteries, as I wished to place them as near as possible over the driving axle. I eventually decided to house them on the frame cross-piece close to the axle. The drawing does not show the arrangement as well as it might, but I am hoping the photograph will. The batteries consist of four $1\frac{1}{2}$-volt cells held in position by a steel strap.



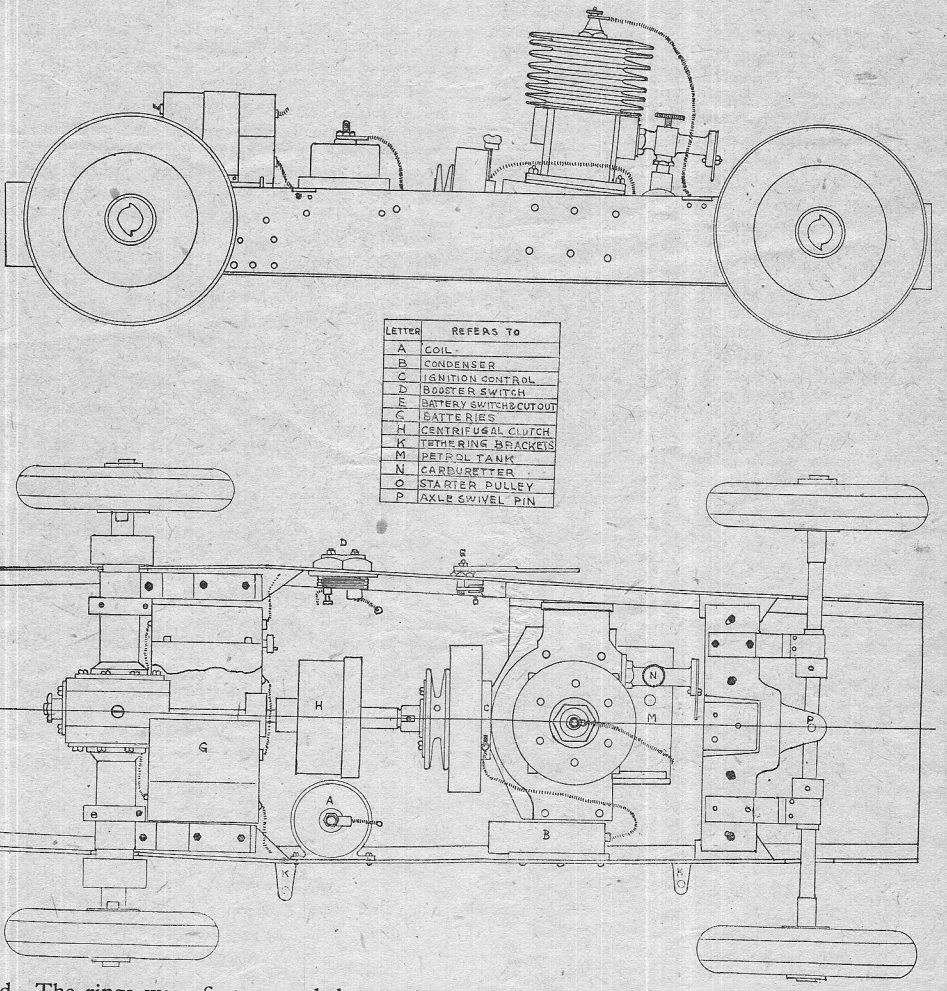
General view, showing exhaust cut-out and booster switch

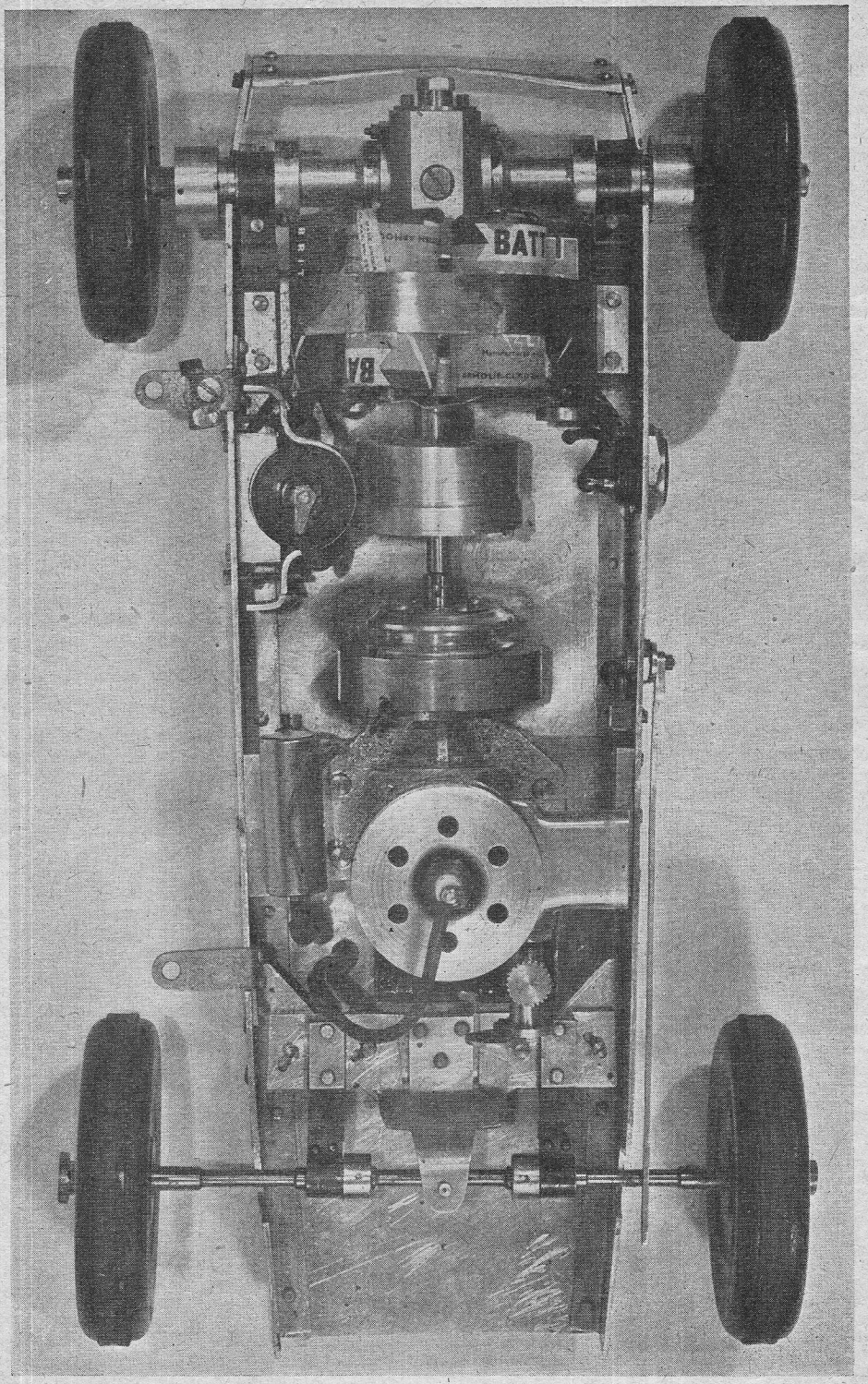
The booster switch was made from a scrap bakelite lamp-holder. It is located through a hole in the side of the chassis and held in position with a dural nut.

The wheels are made from some kind of light wood and fitted with rubber steam-joint rings for tyres. I anticipated some difficulty in stretching the rings into the groove of the wheel ; but, here again, it proved not so difficult as I had anticipated. The rings were first expanded over the jaws of the four-jaw chuck just sufficiently to allow them to be levered on the wheel. The wheel was then threaded on to the plain part of a taper-shank drill held in the tailstock and pushed up to the chuck jaws. A number of sheet-metal strips, ¼ in. wide, were provided to place over the groove in the wheel. This prevents the tyre turning over and dropping into the groove in a twisted position. When the tyre was levered on to the wheel, the strips were taken out one by one and the tyre fell into the groove without any trouble. The wheels were then placed in the chuck and pressed home with a ball-race on a spindle held in the tool-holder and pushed up to the tyre with the lathe revolving. The tyres were then ground to take off the high spots, with the inner driving-wheel correspondingly smaller to accommodate the smaller diameter on which it runs.

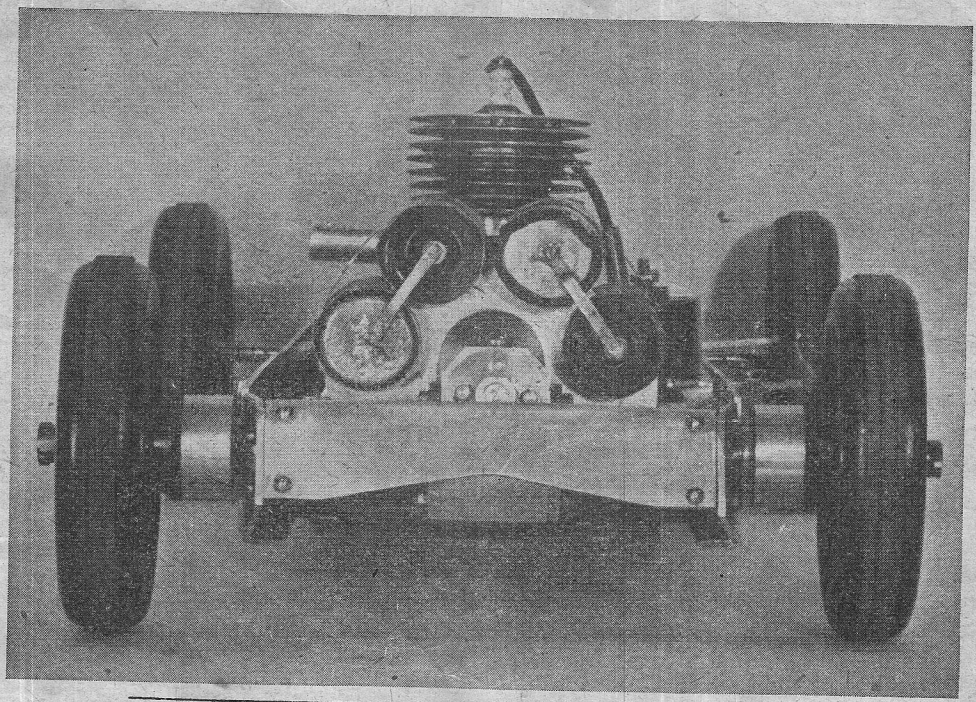
There is always an air of uncertainty with sheet-metal work—anyway, so far as it concerns me—as I never know what the exact finished shape will be like until it is completed. It is purely a question of trial and error with a fair amount of scrap ; but, in spite of it all, one does achieve something, provided there are enough old tin cans to cut up.

The body is in one piece, and is taken off to start and tune the engine ; it is held in position on one side by the exhaust nozzle, and on the other side with a swivelling clip attached to one of the shackle brackets. It was made in two halves and soldered together. When completed to the shape required, the open ends of the chassis were bent to accommodate it. It was then sprayed with cellulose paint and polished. The whole job has occupied about two years of spare time.





Body removed, showing general arrangement



A Fine Adjustment for Linkage

By T. Shearman Gibbons

IN the course of mechanical construction, a frequent problem to be met is providing a means for adjusting the relative angle of adjacent levers by the connecting-links.

In professional engineering, where suitable equipment is available, a right- and left-handed thread is arranged as in Fig. 1.

Turning nut "A" after slackening the lock-nuts will cause the two levers to be drawn together or moved apart, according to the direction of rotation. This system was recommended by "L.B.S.C." for the brake pull-rods on "Petrolea" in the issue of THE MODEL ENGINEER for November 1st. As he surmises, though, few model engineers possess left-hand thread taps and dies.

Even if one has the 60-t.p.i. equipment suggested by "L.B.S.C.," the adjustment made by taking out the pin and turning, as a minimum, half a revolution, means a lineal movement of 1/120 in. at the pin—quite an appreciable amount when dealing with metal brake shoes on metal wheels.

A simple way to attain an adjustment of infinite fineness, which would result in a real feeling of power in the brakes without wheel-locking, is to make one end of the link, say, $\frac{1}{4}$ in. × 40 t.p.i., and the other end, say, $\frac{1}{8}$ in. × 32 t.p.i., both R.H. threads, as indicated in Fig. 2.

One revolution in the appropriate direction would bring the levers together 1/40th of 1/32nd of an inch—or 1/1,280 in.

Coarse adjustment would still be made by taking out the pin at one end and screwing in or out at the 40-t.p.i. or 32-t.p.i. end. After which the "vernier" would be given as above.

Another advantage of the brakes being really accurately adjusted is that the "off" position is closer to the "on" position, resulting in quicker application in an emergency.

Fig. 1.

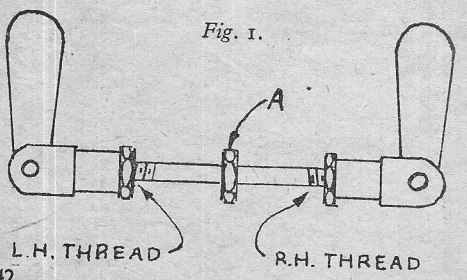
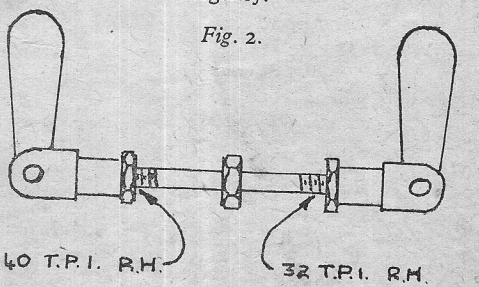


Fig. 2.



"Streamlinia's" New Boiler

By John G. Harlow

MANY readers of THE MODEL ENGINEER have asked me to write an article on the complete power plant of "Streamlinia," a description of which appeared in THE MODEL ENGINEER of January 18th, 1945. I described the engine in detail, and I will now describe the boiler, and try to explain, in detail, how to carry out the construction to completion. Later on, I intend to write a continuation to discuss a suitable boiler feed-pump, its construction and how to make it.

I have experienced difficulty in obtaining suitable materials, but they *are* obtainable if one sets out to get them. You will probably have a few odds and ends in the scrapbox which you will find useful, except for the larger tubes. To procure these, it may mean a tactful and persuasive conversation with the local metal dealer, whom I found to be most helpful.

Here is a list of the various components, the materials and the required gauges: (1) A piece of 4-in. diameter 16-gauge copper tube 8 in. long. (2) 2 pieces of 2-in. diameter 16-gauge copper tube—1 piece 1⅞ in. long and 1 piece 4 in. long. (3) 3 pieces of ⅜-in. diameter 18-gauge copper tube, all 2 3/16 in. long, for water-tubes. (4) 8 pieces of ⅜-in. diameter 16-gauge copper tube 2¾ in. long, and 1 piece of ½-in. diameter tube the same length, for fire-tubes. (5) 1 piece of 16-gauge 1¼-in. diameter tube, 2¼ in. long, for the chimney. (6) 3 flanged discs 16-gauge for the smokebox and flue-pipe ends, and to fit the same. (7) 2 flanged discs 18-gauge for the boiler ends, drilled according to the drawing, to take fittings, etc.; these comprise the main boiler ends. (8) The steam dome, made from 16-gauge copper, drilled to take the safety-valve housing. (9) The fittings and adaptors for the fittings are more or less of the orthodox design and have appeared from time to time in "The Book."

Assuming that all the bits and pieces are at hand, the centre flue tube is the first item on the agenda. This, as seen in the diagram, is made up of three parts, i.e. the smokebox, the fire-tube and the water-tube components.

Two of the flanged end-plates, No. 6 above, are drilled to take the fire-tubes, care being taken not to split the metal between the holes. It is advisable to drill undersize and then file the holes until the tubes will just force in. This allows the solder to take a better grip on the metal. The tubes are then pushed through the holes to protrude ⅛ in. and with the flange outwards, the tubes and plates being properly cleaned beforehand. The fire-tubes are silver-soldered round the ends, leaving a good fillet. This is repeated at both ends. The water-tubes are next silver-soldered into their respective positions. It must be noted, however, that the solder is on the outside of the flue tube, not the inside; so it is best to chamfer the edges of the holes for these.

The smokebox is the next job, and for this the third small flanged plate is required. This is drilled only for the exhaust connection which, at the same time, forms a support for the flue pipe when soldering up the final job. This fitting is turned from brass and drilled to take the exhaust blast pipe, which is bent at right-angles, cut off and silver-soldered to the fitting before the latter is fixed to the flanged end-plate. The fitting is coned for the engine exhaust union and, with the pipe, is pushed through the flanged plate from inside—the pipe pointing vertically upwards—and silver-soldered on both sides.

To complete the flue-pipe assembly, force the water-tube component on to the end-plate of the fire-tube component. Now fit the flange with the exhaust fitting into the smokebox, and the smokebox over the other end-plate of the fire-tube component. The chimney must now be rounded at the top to the curvature of the main boiler barrel, i.e. 2 in. radius. It is then pushed into the smokebox just enough to allow the smokebox to enter the main barrel. (The barrel may be momentarily squashed a little when putting the flue-pipe in, enabling a larger length of chimney to protrude out of the boiler barrel than would otherwise be possible.) Now see that the chimney, centre water-tube and the exhaust ejector are all vertically in line.

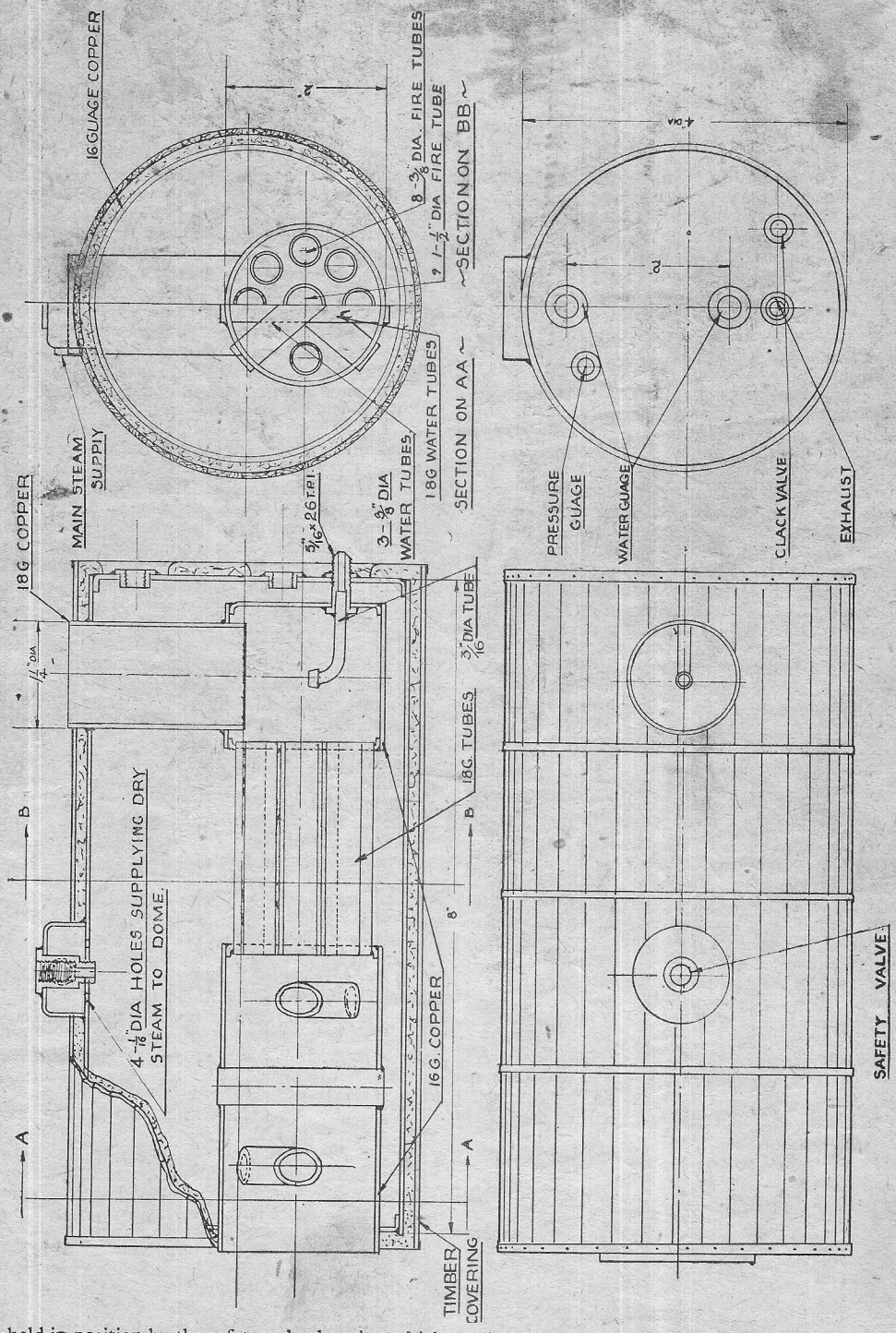
We may proceed with the silver-soldering up to the boiler, and I will set it out in tabular form, following the order of procedure:—

Silver-solder the fire-tube flange to the water-tube component; then the other fire-tube flange to the smokebox; next, the end flange with the exhaust fitting to the other end of the smokebox; and finally the chimney in position, remembering that the unit must go into the main barrel. Although these are set out as separate items, it should be understood that it comprises only one operation, all being soldered with one heating.

This completes the centre flue-pipe, which is now ready to be tested for leaks as follows: Seal the open end of the flue-pipe and the funnel and send a supply of air to the exhaust fitting, with a cycle pump or other suitable means, and submerge under water. Any air-bubbles seen around the joints will indicate a leak. However, very small leaks which are awkward to get at may, in time, seal themselves; such was the case with my own boiler.

If the flue-pipe is satisfactorily air-tight, we can proceed with the next job. The boiler end, other than the one with the flue-pipe hole cut in it, is drilled 5/16-in. diameter, to take the exhaust fitting, so that when the flue-pipe is in position, the smokebox is ⅜ in. from the floor of the boiler barrel. The flue-pipe is now placed in the main barrel with the chimney protruding through the hole cut for it in the 4-in. diameter tube.

The two end-plates with all the fittings, etc., in place are forced, one over the projecting flue and the other over the exhaust fitting, in the ends of the boiler. The steam dome is also fitted and



General arrangement of centre-flue boiler

held in position by the safety-valve housing which can be seen in the diagram. Drill the steam escape holes in the boiler barrel under the dome, and clean thoroughly all the joints which are to be silver-soldered. One can spend valuable time

(*Continued on page 47*)

Mr. F. Mitchell's Model FIREBOAT

General view of boat and plant layout

BECAUSE I have been a member of the National Fire Service for some six years and a keen model boat builder, it was, perhaps, the inevitable outcome of these two interests that I should build a model fireboat.

There are, of course, many types of these vessels, some being conversions from cabin cruisers and the like, whilst others are built and designed for their jobs. Varying in size from about 40 ft. length up to about 100 ft. or more, according to the depth of water and conditions in which they operate, they fall into three main classes : (1) Small flat-bottomed craft used on inland waterways ; (2) larger and more stable vessels, known as "Esturial" class, used in harbours, etc., where they may be called on to work some distance out to sea ; and (3) converted tugs, trawlers, etc., or specially-designed boats of fairly large dimensions, capable of weathering more turbulent seas.

The type I chose is of the "Esturial" class, the model beng broadly representative of a vessel of 80 ft. length and 16 ft. beam. The hull is of wood, "built up," with an average thickness of $\frac{3}{8}$ in., and is 40 in. in length, with a beam of 8 in. —giving a scale of 1 in. = 2 ft. Powered by a twin-cylinder single-acting engine which drives both the propeller and the fire-fighting equipment, she has a centre-flue boiler with hand-feed pump blowlamp-fired, the blowlamp being located at the front end. Ample ventilation is provided by ten port-holes, which are not glazed, and the ventilators on deck.

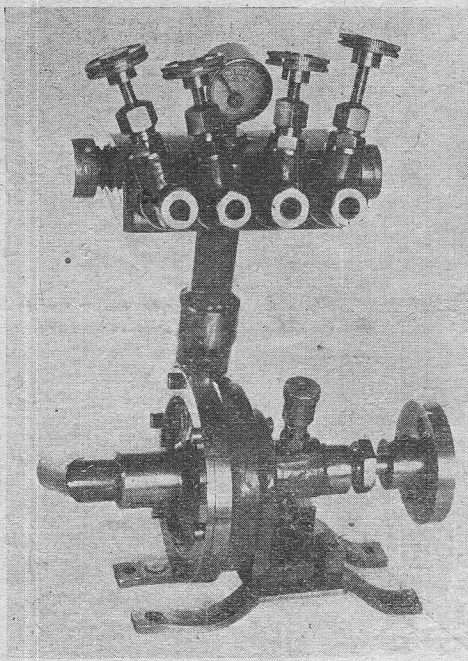
As in full-size practice, the boat carries two permanently-fixed nozzles known in the Service as monitors, which are located one fore and one aft. With a horizontal traverse of 360° and an elevation range of 60°, the nozzle will also depress some 30°. The bore of the nozzle is $\frac{3}{16}$ in. and delivers a water stream about 5 ft. in length. It is locked in any position by the three wheels seen in the photograph and the water-flow is controlled by a screw-down valve.

The centrifugal pump is almost exclusively used for fire-fighting purposes, providing a smooth-flowing supply without the pulsing of a reciprocating pump. It is also extremely flexible and comes to no harm even when all deliveries are suddenly shut down.

In the model there is installed a centrifugal pump which draws water through an intake in the bottom of the boat and feeds up to a delivery-head on which there are two large unions feeding the fixed monitors, and four deliveries with screw-down valves from which hoses can be run for fighting fires in warehouses, dock installations and ships' interiors. In some cases these delivery-heads are swivelling.

As both fire-fighting pump and propeller-shaft are driven by the one engine, some means of disconnecting the drive both to the pump and propeller had to be devised ; so two dog-clutches are installed. On the shaft of the pump I fitted a brass sleeve, which is seized to the shaft by a recessed grub-screw. This sleeve has a $\frac{1}{8}$-in. key-way along its length. A disc was then made a nice sliding-fit over the brass sleeve, with a key to engage in the key-way. Two holes were bored in the face of the disc, to engage with the driving-pins in the engine fly-wheel. Then a groove was turned in the edge of the disc.

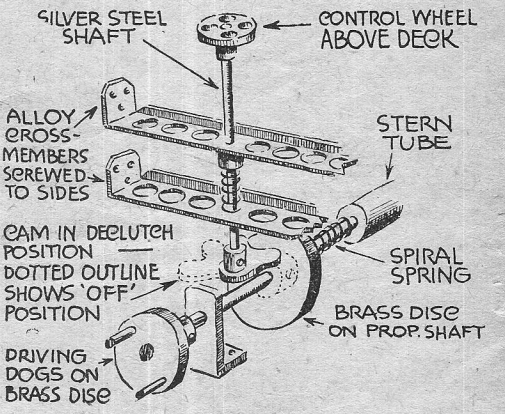
The clutch is engaged and disengaged by means of an alloy fork which is mounted on an alloy bracket screwed to the side of the boat. This fork



The fire pump and delivery head

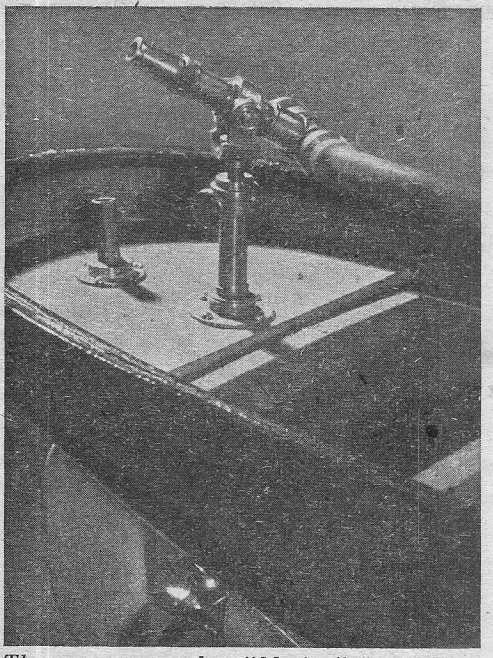
has two adjustable pins which run continually in the groove in the edge of the disc, movement being effected by means of a handle.

The other clutch, to engage and disengage the propeller assembly, is a more simple type. Two alloy cross-members (drilled for lightness) are situated one above the other across the boat, above the propeller shaft. Running vertically through two holes in the centre of these cross-members is a $\frac{1}{8}$-in. silver-steel rod, on the bottom

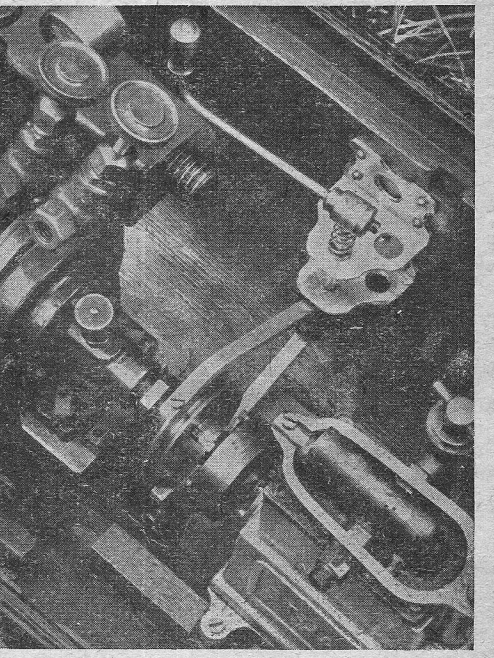


Details of clutch on propeller-shaft

of which there is a cam, and on its top, above deck level, an operating wheel. When the rod is turned, the cam pushes against a flat disc which



The permanent nozzle or "Monitor" fitted at stern



A close-up of the fire-pump clutch

is grub-screwed on to the propeller-shaft, thus moving the whole propeller assembly backwards and breaking the transmission to the propeller. This is visible in the first photograph and detailed in the drawing. It will be noticed that the propeller assembly moves back against a spiral spring which returns the unit back into drive again when the cam is turned back into " off " position.

By means of those two clutches, it is possible to have the fireboat pumping water with the vessel stationary or in motion (frequently a blazing barge or other craft is taken in tow to prevent fire spreading to other vessels, and a stream of water is directed on to the fire from the aft nozzle during the towing operation). Obviously, also, the boat can proceed with the pumping equipment " out of gear." The erection of the superstructure and above-deck fittings has been held up by the fact that I had decided to use aluminium for the deckhouse, skylights, etc., and almost everything else above deck level. Until recently, of course, the metal has been unobtainable ; but this work will be able to proceed and the craft finished.

She has had several trials runs and has behaved satisfactorily in every way. She is painted black above water-line, peach below.

" Streamlinia's " New Boiler

(*Continued from page 44*)

trying to get some solder to run on a dirty surface without succeeding, so it is worth while spending ample time cleaning all the joints. It will pay handsomely in the long run.

In soldering up the boiler, ample heat should be available. A large blowpipe with a good gas supply was used ; but I am sure that it could be done by using a good easy-flow solder and two blow-lamps with large capacities. I mention this because it took quite a long time to solder up the necessary joints in one heat, which undoubtedly is always best.

There are several methods of lagging available. The one I used is perhaps not the best, but it certainly keeps the heat in, which is the main thing. A sheet of asbestos 8 in. long and of sufficient width to go completely round the circumference of the boiler is required. It should be fairly thick, say, $\frac{1}{8}$ in., and is soaked in water and wrapped round the tube, the holes for chimney and dome being cut out beforehand.

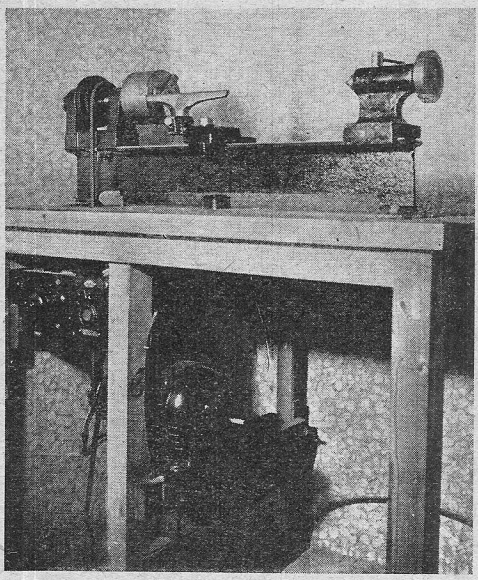
Now, two light copper discs are made from 20-gauge copper, and flanged to fit over the final diameter, which is the boiler diameter plus asbestos and timber covering made from $\frac{1}{8}$-in. × $\frac{3}{8}$-in. mahogany strips of the required length. The final diameter of the copper ends will depend on the thickness of lagging and timber available, so no definite figures can be given here. The flange on these discs should be no less than $\frac{1}{4}$ in. wide, to give sufficient room for tacks when fixing. Holes are cut out to take the fitting, each hole being flanged inwards, while two discs of asbestos are cut the size of the copper discs minus the thickness of the timber. These also have holes cut for the fittings. The timber is now cut and placed round the boiler, being held temporarily with a loop of wire. The discs of asbestos and copper are then fitted. The copper flange should fit tightly over the woodwork and kept in position by short pins pushed through into the woodwork.

Lastly, two or three nickel-steel or copper bands are fitted and pulled up tightly underneath the boiler with screws.

Quite an ordinary paraffin blowlamp is used to fire the boiler, but I should mention that a detachable extension-tube about $1\frac{1}{2}$ in. long is fitted at the mouth of the flue to promote complete combustion. The boiler was subjected to a test pressure of 120 lb. per sq. in. The water-gauge fittings became out of alignment due to a slight bulging in the boiler ends, but these were corrected by inserting a solid plug for a leverage. The boiler has now done two seasons' running in the boat and proved a remarkable steamer for my twin-cylinder $\frac{1}{2}$-in. bore, $\frac{3}{8}$-in. stroke engine, together with the steam-driven feed-pump.

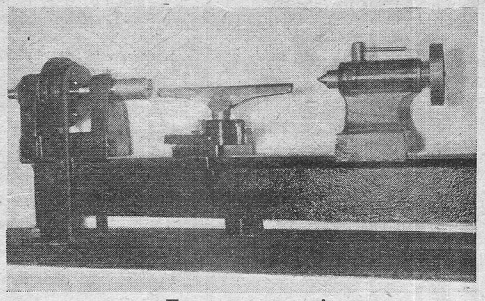
An Auxiliary Lathe

By S. Hinchcliffe



SOME time ago, when coming up against the inevitable problem of grinding tools for my 3½-in. screw-cutting lathe, I contemplated making up a belt-driven grinder. Seeking a vee-pulley as a starting point, a friend gave me a 3-step pulley, and this inspired the idea that the new tool might be made to perform many other functions that could not be done satisfactorily on the screw-cutting lathe. Therefore, the job was built on the lines of a plain lathe of 3 1/16-in. centre height, and adding " bits " from time to time, until already, in addition to grinding and polishing, it is doing excellent service as a wood-turning lathe, router, circular saw, disc sander, internal sander, etc., and is better than the screw-cutting lathe for drilling small holes. It is a cheaply made tool and has so increased the scope of my workshop that I would commend the idea to all home users of screw-cutting lathes.

The illustrations show the machine up to date. The bed is a 2-ft. scrap length of 4-in. × 3-in. R.S.J. with the bottom flange partly cut away by oxygen torch, at a cost of a few coppers. The top flange has been chamfered on both edges to 45° for clamping purposes. It is not necessary to machine the top surface, provided it is reasonably flat.



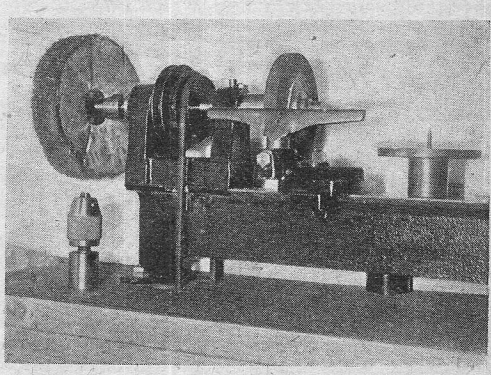
Front centre up !

The front headstock bearing is a g.m. bush clamped in position, the bearing size being 11/16-in. diameter × 1 5/16 in. long. The rear bearing is a Hyatt pre-loaded combined thrust and journal ball-bearing, 9/16-in. bore. The rear end of the mandrel is screwed ½-in. × 24 left-hand, and is fitted with flange nuts, one of them being used to clamp the inner race of the ball-bearing and to act as a dust seal. The boss of the vee-pulley is a close fit on the headstock casting and acts as a seal at the inner side of the bearing. The mandrel nose is a reproduction of that on the screw-cutting lathe, so that chucks, abrasive wheels, etc., can be used on either. The circular saw is 6-in. diameter, and the table hinges on the pin shown and enables sawing to be done to a pre-determined depth for rebates or grooves. Ripping and cross-cut fences were made from angle-section mild-steel.

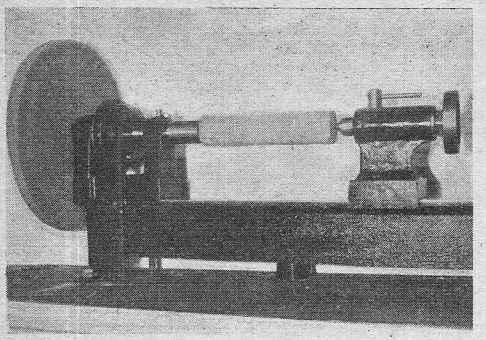
The drive is from a ¼-h.p. motor fitted with over-load release and geared to turn the lathe mandrel at 1,000, 1,500 and 2,000 r..pm. I think it would be an improvement if these speeds were 1,000, 2,000 and 3,000 ; and, when opportunity occurs, I shall fit a new driving pulley to this end. I do not think any increased power will be required for the kind of work I do.

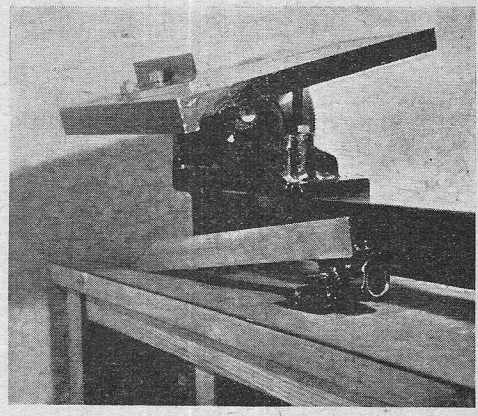
The saw shown is a cross - cut saw. For ripping, it is better to use a ripping-saw, or one of the dual-purpose type. The saw table is 10¼ in. wide × 12 in., and cuts up to 1⅜ in. can be taken.

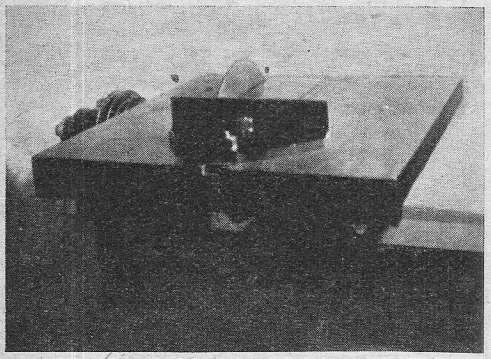
The whole outfit has proved very satisfactory, and stands up to hard work that closely approaches abuse.



Ready for grinding and buffing



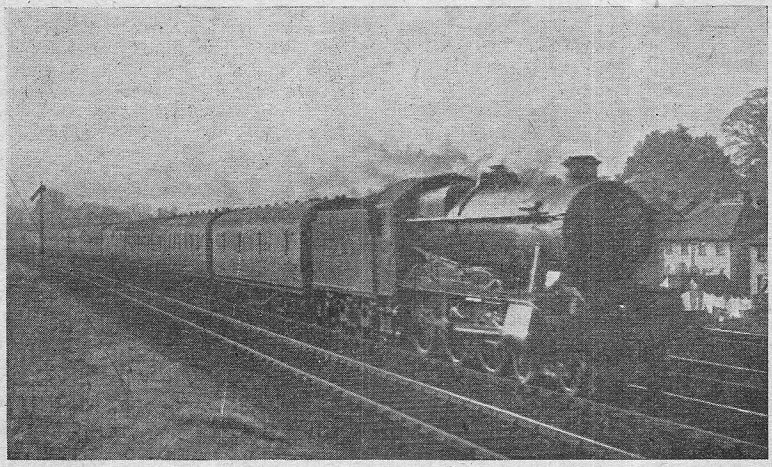




Top left: Turning between centres
Top right: Tilting table
Bottom left: Circular saw attachment

The drawings and patterns were made in my workshop, but I would like to say that the patterns I have made since I had the use of this machine have shown a big improvement, and I have had castings that have been far better than those obtained before. Evidently, the moulder is inspired to better efforts by good patterns.

"1002"



One of the new "1000" class 4-6-0 locomotives on an up Bristol express, with a 13-coach train, G.W.R. At the moment of being snapshotted, she was travelling at about 65 m.p.h.

Letters

Endless Belts

DEAR SIR,—Mr. K. N. Harris's article in THE MODEL ENGINEER of December 13th, page 556, prompts me to indicate another method of making endless belts of any circumference.

From a ship chandler buy sail-maker's twine—beeswax it. Put two nails in the bench, distanced the correct length apart; then wind the twine around the two nails until the belt has become the necessary thickness.

Take off the nails and, to hold it together, marling hitch it throughout its circumference, viz. at about 1 in. spacing. Tuck the ends.

This is the same way a hammock is lashed up and a Sebragee strop (for slinging delicate goods) is the same.

Yours truly,

Bristol. J. C. DAVIS.

Small Steam Turbines

DEAR SIR,—I was very interested indeed in Mr. J. H. Johnson's article on the small steam turbine problem. It is a pleasure to see the problem tackled mathematically from first principles, and the article provides some most useful and valuable data.

I believe that the small steam turbine *is* capable of much improvement, but I part company very definitely with Mr. Johnson when he says he believes the small steam turbine can reach and possibly excel the efficiency of the reciprocating engine of equivalent power. As long ago as 1906 the White steam car engine gave on test a steam consumption of under 12 lb. of steam per b.h.p. per hour. This was a compound engine working around 600 lb. per sq. in. at 700° F. Doble has since brought this figure down to 7 lb. per b.h.p. hour with a triple expansion engine working at a slightly increased pressure and temperature range, and with re-heating stages. I believe the makers of steam turbines of the order of 3-5 h.p. claim nothing better than 60 lb. per b.h.p. hour.

It seems to me that, from *a purely thermal efficiency point of view*, the gap between the small turbine and the small reciprocating set is much too wide to be bridged. For many purposes, the turbine may, however, have compensating advantages which outweigh its appetite for steam. All this is not to suggest that there is not much practical scope for improvement, nor is it to be taken as in any way criticising Mr. Johnson's work. What I am trying to do is to point out that the gap between the two types of prime mover, in the sizes under discussion, is, thermally speaking, so great, and the difficulties of putting the theoretical requirements of a thermally efficient turbine into practical effect, are so great too, that, whilst much improvement may be possible, it is unlikely to be of an order to make the small turbine a serious competitor with the small reciprocator *on steam consumption grounds*.

Mr. Abner Doble dealt very comprehensively with this matter in his series of articles which appeared in *Engineering and Boiler House Review* some time back.

So far as I can remember, I think Mr. Johnson's article is the first to be published in THE MODEL ENGINEER which has made a scientific approach to the subject of small turbine design, and I would like to congratulate and thank Mr. Johnson for his courage in attacking a very difficult subject, and particularly for having the strength of mind to disregard the continuous and quite irrelevant sneers at theory and mathematics.

Yours faithfully,

Wealdstone. K. N. HARRIS.

Model Friends

DEAR SIR,—During the first few years after the 1914-18 war, I was a member of a well-known London model yacht club. In 1923, I advertised in your "smalls" a 10-rater yacht for sale; after several weeks had elapsed, the only reply received was from a gentleman in far-off Adelaide. The results of that letter have been a very close bond of friendship and a very lasting one; during the past years, thousands of letters must have passed between us. He is an engineer, a keen yachtsman and has many other interests which, to some extent, are common to mine. During my membership of the model yacht club he sent three beautiful gilt cups and a plated tea-service to be raced for, and was made an honorary officer of the club. Now, in his 83rd year, he is hale and hearty at Perth. Can any other reader of this weekly claim such a long and, if I may add, an affectionate friendship through an advertisement?

Yours faithfully,

Chingford. J. R. MILTON.

Fabrication

DEAR SIR—Your remarks about fabrication in a recent issue are very interesting, and probably most engineers will agree that, for prototype modelling, the use of castings is desirable. At the same time, your warning not to be too critical of built-up substitutes is very appropriate, because fabrication has become a permanent form of engineering structure and will continue to do so increasingly. The built-up article in any form of engineering is also a stimulant to ingenuity.

Arising out of this, I feel that it is essential to cultivate a definite mentality for fabrication where parts can often be made stronger, lighter and better adapted to production than castings. It is, for instance, twenty years since the uses of fabrication were realised for electric motors, but quicker application has been partly due to a lack of appreciation, and this retarded the consequent leap in welding methods which made fabrication easier and cheaper.

Another aspect which this introduces is that of not overdoing interest in historical work and thereby sticking to older methods. Occasional excursions into the past are necessary for maturing younger minds by making them realise the work and ingenuity by which modern machines have reached their present stages, but I see no reason why a modern streamlined locomotive, for instance, is not as satisfactory to copy as the blob and gadget machines of the past. Provided all the works are under the cover, that

feeling of power and motion is still there and perhaps even more so. Opinions differ widely on these subjects, but I am all for imitating the best modern practice in construction, while realising that the best things of the past were efficient and beautiful in their day.

I should at least like to support your views from the ranks of engineers who are ever striving to maintain this country's achievements ahead of all-comers, whether in large or small scale.

Yours truly,

Bovingdon. P. F. GROVE.

Where are the Northerners?

DEAR SIR,—I duly read Mr. John Houstown's letter in the November 15th issue of THE MODEL ENGINEER, asking "Where are the Northerners?" and would add, "Where indeed." To a foreigner one would think that the only locomotive engines of any importance in Great Britain are in the South of England, and that those built in the North of England are not worth a coat of paint.

Now I can recall some little tank engines on the old North Eastern Railway, that gave a good account of themselves, followed later by more modern ones of larger dimensions, and much more powerful to cope with increasing loads.

Parallel with this, the Tender engines were clipping off plenty of miles, and they, too, were being built bigger and bigger, *and* I believe I am right in claiming that the old *North Eastern* did quite as much experimental work as did any other British railway company. They even tried out the *Stumph* uniflow system, and then some compound types, followed by the multiple cylinder type.

I can conceive no more handsome express locomotives than Worsdell's. They had beautiful lines, graceful, and were in a class by themselves. In short, real *thoroughbreds, greyhounds* in fact, whose sleek lines and contour generally spelled *speed.*

Now this may bring a yelp from the *Terriers,* but what of it, throw them a bone and pacify them. They have had the stage for quite a while, so give the greyhounds and our Northern greybeards a chance.

Was it not in London where some dude said of George Stephenson, "Here we have with us a gentleman from the North of England who proposes to revolutionise transportation through the medium of some cumbersome steam contraption (laughter). I question whether Mr. Stephenson has even mastered the rudiments of chemistry (more laughter)."

Well, Stephenson is still with us in memory, revered and beloved as a man of humble origin, and who rose to great heights despite overwhelming handicaps.

Now you Geordies, take it up from here, (I'm getting old), carry on our heritage.

Yours truly,

Rocky River, Ohio. P. W. WILSON.

Honour for Mr. E. Exley

DEAR SIR,—I thought that it might be of interest to your readers to know that Mr. Edward Exley, the owner of the well-known Bradford engineering firm bearing his name, has been elected an Associate Member of the Institution of Mechanical Engineers.

I am open to correction, but I think he is the first trader and manufacturer of miniature railway equipment to be so honoured, although Mr. W. J. Bassett-Lowke has been a member of the Institution of Locomotive Engineers for some time.

Yours faithfully,

Worksop. V. BOYD-CARPENTER

Clubs

Nottingham Society of Model and Experimental Engineers

The recent change to two meetings each month has proved a great success. The meetings have been well attended and the talks given have aroused great interest and considerable discussion.

On January 23rd, Mr. Chrichlow, of the Nottingham Model Yacht Club, will give an address—"Building and Sailing Model Racing Yachts."

Hon. Sec.: E. V. HODSON, 42, Priory Road, West Bridgford, Nottingham.

The Kent Model Engineering Society

The following meetings have been arranged:—

January 14th.—"All Alone," by Mr. Tanner.

January 21st.—Rebuilding a 1-in. scale Pacific locomotive, by Mr. T. Wattingham.

January 28th.—"Dot 4," by Mr. Sherwood.

The society will be taking possession of its new headquarters, The Alford Sports Club, Crantock Road, early in the New Year, where it will be possible once again to hold demonstrations, track runs, film shows, etc. Meanwhile, visitors are always welcome at the Davenport Hall, Catford, every Monday evening, 7.30 to 9.30 p.m. The society would like to convey to all other clubs and societies its best wishes for the New Year.

Hon. Sec.; F. H. GRAY, 3, Jutland Road, London, S.E.6.

Merthyr Tydfil Society of Model Engineers

Efforts are being made to establish this society in the Queens Road Youth Centre. Every Friday evening from 7 to 9. A well-equipped workshop is available to all interested.

Communications to Hon. Sec., A. J. PRICE, 19, First Avenue, Salon-Uchaf, Merthyr Tydfil.

Exeter and District Model Engineering Society

Meetings will be held at 49, Prospect Park, on the first Saturday in each month at 6.30 p.m. No further written notices will be sent by post.

Hon. Sec.: GEO. W. BELL, 44, Retreat Road, Topsham, Nr. Exeter, Devon.

The Bristol Ship Model Club

On December 11th the Secretary brought along his ¼ in. to 1 ft. scale model *Cutty Sark*, which created considerable interest, as well as some discussion amongst members with regard to larger scale model making, as against the more popular ⅛ in. and 1/10 in. to the foot work. Some 2,500 copper plates encase the hull of this ship, which has been made to Dr. Longridge's book on the subject.

The acquisition of ships' plans, etc., being part of the objects of the club, a librarian has been appointed in the person of Mr. N. Poole, who will now have this business in hand.

Future meetings are on January 22nd and February 12th, 1946.

Anyone in the district interested should write to the Hon. Sec. and Treasurer, ARTHUR W. KITTON, 29, New Fosseway Rd., Knowle, Bristol 4.

South London Model Engineering Society

On Sunday, January 20th, Fl.-Lieut. C. M. Rostrom, D.F.C., will give a talk on Flying; the meeting will be held at Kings College Sports Ground, Dog Kennel Hill, S.E., and will commence at 11 a.m.

At the meeting for February 3rd, Mr. Cunningham will describe the making of boat hulls in wood.

The mid-week meeting for Wednesday, January 30th, at 7.30 p.m., is a talk by Mr. Davis, who will describe the construction of his 5-in. gauge saddle tank locomotive.

A most interesting series of talks and lectures have been arranged for 1946, together with track runs, and those unattached model engineers should get in touch with the secretary: an invitation to any meeting, with particulars of membership, will gladly be sent.

Hon. Sec.: W. R. COOK, 103, Engleheart Road, Catford, S.E.6.

Staines and District Society Model Engineers and Craftsmen

A series of lectures and discussions on matters of interest to model engineers has been arranged for the monthly meetings during 1946. Subject for January: "Proposed Multi-gauge Track Layout for the Club."

Interested modellists are welcome at our meetings, held first Tuesday each month at Phoenix Hotel, Church Road, Staines.

Hon. Sec.: RONALD F. SLADE, 166, Kingston Road, Staines, Middlesex.

Merseyside Live Steamers

As a result of the kindly interest of the Housing Department of the Corporation, the site of a disused pit, unsuitable for building, has been obtained on lease. As the area is approximately 1,400 sq. yd., a continuous track of about 350 ft. should be possible. The actual design has not been determined in detail, but it is expected that a multi-gauge track to take 2½-in., 3½-in. and 5-in. locomotives will be available by next Spring.

The third annual general meeting will be held in the Clubroom on Tuesday, January 22nd, 1946, at 8 p.m. Agenda: Adoption of Treasurer's Accounts for 1945; Election of Officers for 1946; any other business. Members are requested to make a special effort to attend. Full particulars of membership may be obtained from the Hon. Sec., A. F. DUCKITT, 145, Bowring Park Avenue, Liverpool 16.

Mansfield and Sutton-in-Ashfield Society of Model Engineers

Usual fortnightly meeting of the above newly-formed club was held in Messrs. Morley's Factory Canteen, Penn Street, Sutton-in-Ashfield, on Thursday, December 13th. The workshop in Bourne Street is being fitted up (work being done on this every Sunday morning). New members welcomed at the canteen or workshop as above.

Hon. Sec.: C. NICHOLSON, 65, Outram Street, Sutton-in-Ashfield.

The West Midlands Model Engineering Society

A very successful first post-war meeting of the above Society was held at the Alma Inn, Five Ways, Brierley Hill, on Monday, December 10th, 1945.

Programme arranged for 1946 includes an exhibition in the Spring and a regatta in the early Summer, at the Society's pool.

Future meetings will be held at the same place on the first and third Mondays in each month at 7.30 p.m.

Members are invited to bring models and parts for show and discussion.

Hon. Sec.: V. H. WHITEHOUSE, Brierley Hill Eng. Co., Kinver Street, Wordsley, Stourbridge. ('Phone: Brierley Hill 7398.)

Hull and District Society of Model and Experimental Engineers

After the outstanding success of our recent exhibition, all members are looking forward to an interesting year.

Meetings are still held in the Trades and Labour Club, Beverley Road, Hull, and visiting club members will be particularly welcome.

Next meeting January 17th and every fortnight after.

Hon. Sec.: F. V. INGRAM, "Woodlea," Thorn Road, Hedon, E. Yorks.

The Oldham Society of Model Engineers

Our next meeting will be held on Friday, January 11th, 1946, in No. 3 room, Co-operative Educational Building, King Street, Oldham. Commencing 7.30 p.m. prompt.

A demonstration of an Inverted Oscillating Engine, by J. Woodley, as illustrated some time ago in THE MODEL ENGINEER, will be given.

Hon. Sec.: W. K. BUCKLEY, 87, Lyme Terrace, Highfield, Mossley, Lancs.

NOTICES

The Editor invites correspondence and original contributions on all small power engineering and electrical subjects. Matter intended for publication should be clearly written, and should invariably bear the sender's name and address.

Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All correspondence relating to sales of the paper and books to be addressed to Percival Marshall and Co. Ltd., Cordwallis Works, Maidenhead, Berks.

All correspondence relating to advertisements to be addressed to THE ADVERTISEMENT MANAGER, "The Model Engineer," Cordwallis Works, Maidenhead, Berks.

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